THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

COMPUTERWORLD

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TOP OF THE NEWS

IBM garners $17.15 billion in the fourth quarter of 1985, but that is not enough to offset fully the profit decline in the previous three quarters. DEC and Honeywell also chime in with impressive results for the latest quarter. **Page 146.**

■

Ashton-Tate recalls most of its DBase III Plus shipments due to networking problems. **Page 9.**

■

The young electronic publishing industry wins a $310 million endorsement from the U.S. Army. **Page 13.**

■

IBM promises to link up with MAP users. **Page 4.**

■

Gould upgrades its PN6000 and PN9000 minicomputer lines and signs on for Sun workstations. **Page 37.**

■

In the wake of Honeywell's decision to discontinue its Multics operating system [CW, Jan. 13], sources report that Theodore R. Josephs, vice-president and general manager of the office marketing systems division at Honeywell, has resigned. A company spokesman refused to confirm or deny the status of Josephs, a 20-year Honeywell veteran. Josephs was in Hawaii with the Honeywell Large Systems Users Association and could not be reached for comment.

■

DEC has scheduled Jan. 29 as the date of a "major, major announcement." The company hinted that the announcement will impact the VAX line that ranges from the Microvax II supermicrocomputers to the 8600 and up superminicomputers. One product eagerly awaited is the BI Bus, which will tie Microvax machines to larger VAX equipment.

■

Artificial Intelligence Corp. and Kurzweil Applied Intelligence, Inc. will jointly market a voice input option for AI's Intellect natural query language. The product will allow users to retrieve and analyze data base information by voice through a microphone. Intellect resides

See **NEWS** page 7

Apple renews bid for office sales, trust

Macintosh Plus, printer keys to "connectivity" plan

By Peggy Watt

SAN FRANCISCO — Vowing to renew efforts to penetrate the IBM-dominated large corporate accounts market, Apple Computer, Inc. last week introduced enhanced versions of its 2-year-old Macintosh computer and year-old Laserwriter printer. Previous efforts, including the now-abandoned Macintosh Office campaign, have been unsuccessful.

Appearing before a company-sponsored gathering of dealers, software developers and business customers, Apple executives claimed the firm's products can still have a profitable role in a corporate market that has standardized on IBM microcomputer technology.

"I know the real commitment from business customers must be earned by meeting customer needs, by living up to expectations and by keeping promises," Apple President John Sculley told the gathering. "We intend to do all of that."

Sculley and others in the Apple hierarchy played host to a flurry of product announcements, including the enhanced Mac, and announced commitments by third-party developers to provide add-on features and software packages for the Macintosh (see related story page 8). The company also announced an operating agreement with Northern Telecom, Inc. to provide methods for networking Macintosh computers through Northern Telecom's private branch exchanges.

"Every product that is part of our connectivity strategy is on schedule and will ship on time," he said.

The new system offers more memory, a bigger keyboard that includes cursor keys

See **APPLE** page 8

GE's 20,000 micros tied in site license

By Eric Bender

BRIDGEPORT, Conn. — In one of the most significant site licensing agreements to date, corporate giant General Electric Co. last week confirmed that it had contracted with two software vendors to allow GE unlimited copying rights for the electronics firm's estimated 20,000 microcomputers.

GE signed deals with Computer Associates International, Inc. and Office Solutions, Inc. The agreements covered companywide site licenses for Computer Associate's Supercalc spreadsheet package and Office Solutions' Officewriter.

"We pay once at the corporate level, more or less, and get quality word processing and spreadsheet products that satisfy

See **GE** page 4

DEC unit heats workstation war

By Donna Raimondi

Plugging a critical hole in its technical workstation line, Digital Equipment Corp. last week unveiled a Unix-based color version of its Vaxstation II engineering system.

The Unix offering places DEC directly in competition with Apollo Computer, Inc. and Sun Microsystems, Inc. Another potential competitor is IBM, whose frequently reported engineering workstation product is expected to be announced in the very near future, possibly as early as this week.

DEC's Vaxstation II/Graphics Processor Extended, announced last week, is available with DEC's Ultrix operating system,

See **DEC** page 6

CW EXCLUSIVE

Sideline view: Users want resolution to relational debate

By John Gallant

One clear message conveyed by users in the wake of the most recent flare-up of the debate over relational data management is that the controversy has spawned considerable confusion. That unease, users believe, is in turn slowing adoption of relational technology.

Listening intently from the sidelines to the debate sparked by E. F. Codd's recent *Computerworld* articles [CW, Oct. 14; Oct. 21], many users have been left wondering why some commercial implementations of relational fall so short of Codd's theoretical mark. Codd, developer of the relational model for data management, outlined 12 standards against which data base management system products should be judged. His comments drew strong response from others, like John Cullinane, chairman of Cullinet Software, Inc., who claimed vendors often must stray from the theoretical roots of relational to implement real-world systems.

"Relational is a nebulous term," said Myles Walsh, director of data library development for the CBS Records division of CBS, which runs IBM's DB2 relational DBMS on an IBM 3081 processor. "The same vendors that claim to have relational systems talk about differing from the model to implement real-world systems. Are they talking out of both sides of their mouths? It seems that the definition of relational is in the mouth of the definer."

George Waybright, MIS director for Pic 'N Pay Stores, Inc. in Matthews, N.C., echoed Walsh's comments. After reading Codd's 12 basic rules of relational architecture, Waybright said, he found himself somewhat mystified.

"I thought we had many of Codd's rules covered with Cullinet's IDMS/R. Then I read that IDMS/R didn't adhere to

See **RELATIONAL** page 7

NEWSPAPER

Integrated voice/data terminals: Orphans in the desktop market

Users remain unconvinced of workstations' benefits

By John Dix

Once conceived as the ultimate desktop tool, the integrated voice/data terminal (IVDT) has never found a home. Would-be vendors of IVDTs have been plagued by slow sales that have killed some start-up vendors, crippled others and left only a few marginally successful.

The dramatic turnabout blindsided a technology that many believed could not fail: devices that married terminals and micros with the ubiquitous telephone for the ultimate desktop necessity. Vendors, ambitious start-ups as well as industry veterans such as Rolm Corp. and Northern Telecom, Inc., rushed into the market in 1983-84. But today, sales are at a snail's pace, and future prospects are not rosy.

The problem, it seems, lies in convincing users to shell out money for products that combine the function of present desktop tools. "There is no overwhelming application for integrated voice/data terminals," according to Amy Smith, a senior analyst with the Yankee Group, a Boston-based research outfit.

> *'There is no overwhelming application for integrated voice/data terminals.'*
>
> — Amy Smith, a senior analyst with the Yankee Group

Some advantages of IVDTs — depending on the type — include automatic dialing from a directory data base, voice annotated text messages, personalized voice messaging, time keeping, date, duration of calls and automatic logon procedures.

Smith segmented the multifaceted IVDT market into four general categories: generic terminals or personal computers with integrated telephones like Zaisan, Inc.'s ES.1 and ES.2 and Northern Telecom's Displayphone; IVDTs that are proprietary to manufacturers of private branch exchanges (PBX) such as Rolm's Cypress and Cedar; personal computer add-on products like Natural Microsystems Corp.'s Watson; and distributed system terminals, usually minicomputer based, such as Sydis, Inc.'s Voicestation System.

Although none of the categories has found widespread acceptance, some are faring worse than others. Casualties are perhaps the highest in the generic IVDT segment, but even that slice has its bright spots. Houston-based Zaisan is proceeding under Chapter 11 of the Federal Bankruptcy Code, and Cygnet Technologies, Inc., of Sunnyvale, Calif., has been forced to rethink its strategy and is now selling its Co-system in pieces. On the other hand, Davox Corp. of Billerica, Mass., continues to be successful, claiming to have shipped 5,000 units by the end of last year and generating revenue in the range of $10 million.

"The Zaisans and Cygnets of the world were trying to provide a workstation that would compete with a personal computer as well as have telephony capabilities," explained Christine Hughes, vice-president of the office systems service for the Gartner Group, Inc., a Connecticut research firm. "Most people in the Fortune 1,000 — maybe Fortune 1,500 — already have PCs on their desks, so these vendors didn't stand a chance of replacing those PCs with an integrated box."

Hughes said Davox owes its success to its niche marketing. "Davox isn't trying to be a generic IVDT supplier," she said. "It is going after a specific market, primarily the replacement of IBM 3270 terminals, and has gone after specific kinds of applications that need the integrated telephony capability."

Zaisan's marketing campaign failed to find a niche. The company tried to break into the retail market, only to discover later that it would have been better off trying to sell into vertical markets.

An inventory crunch iced the cake. Zaisan stocked up to meet large OEM contracts that later evaporated, putting the company in a cash bind. In November, a company submitted a purchase proposal to Zaisan's board of directors. That bid is currently being mulled over by a bankruptcy court and Zaisan's creditors.

Functionality is also a fault of some of the proprietary IVDTs sold by PBX vendors. "Rolm's Cypress, Cedar and Juniper — the most complete family of IVDTs currently available — cater to an ambiguous conception of voice/data integration and are fraught with technical limitations and constraints," according to the report titled "IBM-Rolm Integrated Voice/Data Terminals" from Northern Business Information, a research house in New York.

The firm faults Rolm's products on their single-tasking operating system and inability to perform terminal-to-terminal text transfers. The Yankee Group estimated Rolm shipped 3,000 units of its three products in 1985.

After a slow start, vendors of personal computer add-on products are having more success. This micro add-on market is typified by Natural Microsystems' Watson product, which provides personal voice messaging and directory features, and Rolm's Juniper, a board that ties an IBM Personal Computer to a Rolm switch.

"Roughly 10,000 PC add-on units were shipped in 1984," Smith said, "and that will grow 15% over the next few years."

Charles Foskett, president of Natural Microsystems, admitted that it has been a hard sell. "When you're dealing with a new technology, regardless of what the product is, people don't know they want it," he said.

A criticism of most IVDTs is that the actual integration is superficial. "High-level integration is when you start treating voice like data, start doing things like voice recognition and text to voice and vice versa," Smith said.

Sydis does some of that. Its Voicestation System, however, differs from other vendors' units in that its system is driven by an AT&T Unix V-based minicomputer. "We've integrated voice into our applications," according to John Clark, company president and chief executive officer.

"Sydis has had a real problem trying to get major OEMs to commit to their product," said Hughes from the Gartner Group. A larger problem for Sydis, however, may be IBM's presence. "In the U.S., you already have the de facto workstation, the IBM Personal Computer. Sydis has to go in and tell users you don't need the PC."

Even in the face of such dire market conditions, analysts admit that IVDTs will be commonplace in five years. The trick is making them useful. "Users have not been convinced there is a need for integrated station equipment since voice networks and data networks are traditionally distinct domains," Northern Business Information reported.

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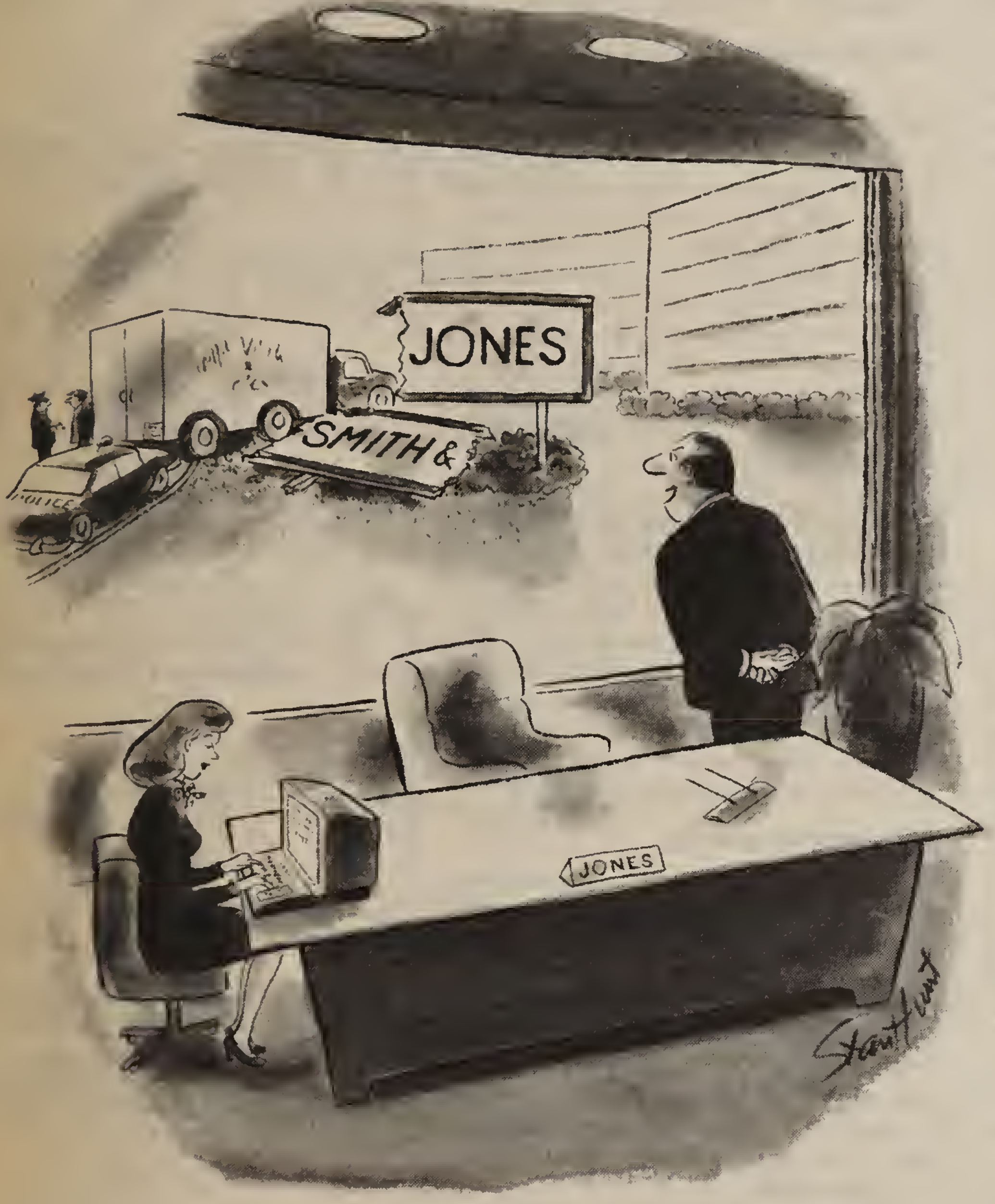

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CW 1/20/86

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MAP conference backdrop for product, project debuts

IBM cites plans to link with GM protocol

By Rosemary Hamilton

TORONTO — This year's first meeting of the U.S. Manufacturing Automation Protocol (MAP) User Group, held last week, garnered additional support for MAP as the manufacturing communications standard.

In addition to a record number of users attending — 550 — the conference was used to unveil an estimated 15 to 20 products or development projects, according to Charles Gardner, chairman of the MAP/Technical Office Protocol steering committee of the Society of Manufacturing Engineers, which sponsored the users' meeting with its sister organization in Canada.

In the keynote address, John Klein, general manager of manufacturing systems products at IBM, announced a joint development agreement with Industrial Networking, Inc., which is a joint venture of Ungermann-Bass, Inc. and General Electric Co.

Details of the agreement were sketchy, but Klein said that IBM will be working with Industrial Networking to implement MAP technology in an environment using IBM computers and a variety of intelligent devices from other manufacturers.

Gardner said the conference was also used to discuss the Corporation of Open Systems, a recently announced nonprofit consortium of 18 vendors, that is scheduled to hold its first public meeting this week. The group has been set up to provide a framework of standards and to help create uniform tests for equipment. "We consider it very significant," Gardner said. "It's in parallel with what we've been trying to do. We encourage users and vendors to become involved."

MAP is the emerging manufacturing communications standard promoted by General Motors Corp. and is based on the International Standards Organization's Open Systems Interconnect, a seven-layer network model used to connect various vendors' equipment.

The layers control the complete process of networking, from the very basic to the most complicated: the first layer is the physical link, which concerns how data should be sent over a transmission facility, and the seventh layer, called the applications layer, provides a number of functions that enable users to locate and move data through the network.

Other vendor announcements included a communications software product from Stratus Computer, Inc., a maker of fault-tolerant computers. The MAP Communications Support package, said to be compatible with MAP standards, will be sold on a limited availability basis at a cost of $10,000 per Stratus module, according to Thomas Clifford, manager of communications programs.

Stratus tool said to conform to MAP

Clifford said the software product conforms to all the layers of the MAP protocol that have been specified by the MAP Standards Organization. The sixth layer has yet to have a formal standard adopted for it. The Stratus software "follows the MAP specification that places that layer in the null mode," Clifford said. Once a standard is established, he said, Stratus will implement it.

The firm said MAP Communications Support has been successfully tested at the GM test facility in Warren, Mich. However, since MAP is still in its early stages, Stratus will offer the product to a limited number of customers so as to support it adequately.

In addition to its agreement with IBM, Industrial Networking said it will sell a starter kit for its MAP/One local-area network system for $60,000. Customers who purchase the product, called Intro/MAP, between now and April 30 will pay $44,000.

Intro/MAP, designed to give users "a taste of MAP," according to a spokesman, is a fully functional local-area network. The package includes a network management console with operating software, a head-end remodulator, two board-level interfaces, a cable starter set, network monitor system software and a one-day tutorial.

Second-class postage paid at Framingham, Mass., and additional mailing offices.

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GE micros tied in site license

From page 1

the needs of most users," said Jeffrey Ehrlich, manager of product technology at GE's Corporate Information Systems.

'Don't have to worry about being sued'

"We don't have to worry about keeping track of everything. We don't have to worry about being sued. It's clean," Ehrlich added.

GE tried unsuccessfully to reach a similar arrangement with Lotus Development Corp. for its 1-2-3 spreadsheet, according to Ehrlich, but "Lotus was not oriented toward this kind of license." Now, Ehrlich explained, "GE users have the choice of using Supercalc at no charge or using Lotus and paying whatever the price happens to be."

He predicted, however, that some users will continue to purchase 1-2-3 and that Supercalc will not necessarily replace 1-2-3. "We have a lot of copies of 1-2-3, and I don't see people throwing them out the window." Users who wish to exchange data between the two programs can do so through Supercalc's import/export facilities, he pointed out.

Lotus position shifting

The announcement, meanwhile, follows recent signs that Lotus is shifting its stance on the site license issue. Lotus has acknowledged that Exxon Corp. is testing a site licensing system under which a program is installed on a customer's mainframe and downloaded by users. Users, however, can only download as many copies of the program as specified by the agreement.

"We are testing, which is to say experimenting, potential solutions to the site licensing issue with Exxon. The one that is being tested at Exxon is simply software that sits on the mainframe and is served to end users on dumb terminals and PCs," said Ronald Scott, Lotus vice-president for corporate communications.

But there is doubt as to how popular the Exxon method of distributing licensed copies would be with corporations. One distributor said he believes that problems with access to software documentation and a reluctance of corporations to install the program on a mainframe must be considered.

Computer dealers expect that only highly select dealers with established relationships with major corporations will be allowed to sell site licenses. However, Lotus refused to provide details on dealer participation in any site licensing program. The company will not talk publicly about methods of selling site licenses, Scott said.

He confirmed that a site licensing program would be available this year but declined to be specific.

Many observers said they believe a program will be announced by this summer.

"I think second quarter is probably a pretty good target," said Rick Faulk, president and chief executive officer of First Software Corp., a Lawrence, Mass.-based software distributor.

Senior writers Douglas Barney and Peggy Watt contributed to this report.

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Sun rises in low-end market

Unix-based workstation available for entry level

By Maura McEnaney

MOUNTAIN VIEW, Calif. — Sun Microsystems, Inc. today announced a version of its Sun-3 AT&T Unix-based line of workstations that is less than half the cost of the firm's existing products.

The move into the low-end market was seen by some as an attempt to establish a position before Apple Computer, Inc.'s expected entry into the Unix workstation market. "It's a nice little preemptive move on their part," said Valerie Rice, an analyst at International Data Corp./West. "Apple is reportedly preparing to do a Unix-based machine; Sun already has a strong position in that market, and it wants to keep it," she said.

The company said it expects that the Sun-3/50M introduction will bring Unix workstations into traditional MIS departments that have been anxious to experiment with, but have been unable to afford, the high-priced workstation. Company spokesmen said the product is a direct response to the user demand for low-cost systems. More than 100 units have already been shipped, the spokesmen said.

"Many companies have been curious about trying Unix workstations but have not been able to justify the cost," Rice said. "A low-end workstation is likely to help them in the corporate marketplace."

Priced at $7,900, the Sun-3/50M machine provides much of the same functionality as high-end Sun workstations, including a 32-bit architecture, 4M bytes of main memory expandable to 16M bytes, high-resolution graphics, an identical software environment and user interface.

A hard-disk version of the Sun-3/50M was also announced. Priced at $13,900, the Sun-3/52M is a stand-alone processor equipped with a 71M-byte hard disk and a 60M-byte, ¼-in. cartridge backup tape. It is priced at $13,900.

Cosmetically identical to the Sun-3 line of workstations, which are priced from $15,000, the 3/50M has processing speeds of up to 1.5 million instructions per second (MIPS) and a main memory of 4M bytes. According to John Hime, product marketing director, cost reductions are achieved through the use of four CMOS gate arrays that replace about 150 integrated circuits now used in the Sun-3 line.

The architecture allows reduced space requirements and reduces cost by putting the workstation design onto one board, he said.

When compared with Apollo Computer, Inc.'s DN330 workstation, Sun provides twice the processing power for approximately half the price, Hime noted. Sun claims its 3/52M stand-alone model provides about 33% more MIPS, twice the main memory and twice the disk capacity for about half the price of Digital Equipment Corp.'s DEC Vaxstation II, which provides 2M bytes of main memory and 31M bytes of mass storage at a processing power of 0.9 MIPS for $26,000.

The 3/50M is based on Motorola, Inc.'s MC68020 32-bit processor running at 15 MHz. It includes an Ethernet controller, two serial ports, small computer systems interface, mass-storage host adapter and ports for a keyboard and mouse. Sun's 19-in. monochrome display is 900 by 1,152 pixels. Options include a Motorola MC68881 floating-point coprocessor, priced at $700.

In addition to the two workstations, Sun announced a price reduction for memory expansion that is added at the time of purchase. Under the new plan, additional memory has been reduced from $1,500 per megabyte to between $833 and $1,000.

DEC unit heats workstation war

From page 1

and by the summer of 1986, the system will be available with the MicroVMS operating system. It combines a Microvax II with a proprietary very large-scale integration graphics coprocessor and a floating-point processor.

The Vaxstation II/GPX graphics processor has a chip set architecture that supports four or eight bit-planes — or layers of pixels — of display memory. The four-plane versions give a palette of 16 colors out of 16 million; the eight-plane versions offer 256 of the same 16 million colors.

The graphics processor consists of one chip that is used as a math processor and one for each plane to manage the movement of bits on the screen. This arrangement ensures that the graphics processor does not slow down when color is added, said William Steul, DEC's group manager of engineering systems.

The system positions DEC strongly against Apollo's DN560 and Sun Microsystem's Sun-3 series computer-aided design and manufacturing systems. "DEC is doing the right thing by anticipating IBM competition in the design area," said Henry Kellogg, computer-aided design and manufacturing analyst at the Yankee Group in Boston. Kellogg said he expects IBM to announce a design workstation by the end of January.

Apollo would not confirm or deny that it won part of a large General Motors Corp. workstation contract recently, a contract that DEC could not compete for because it did not have a Unix-based workstation at the time.

DEC, which claimed to "leapfrog the competition" with this product, may not be king of the hill for too long. IBM and the Chelmsford, Mass.-based Apollo are both expected to roll out workstations in the next few weeks that will challenge the marketplace newcomer.

A low-end, gray-scale version of the DEC workstation costs $33,000, and three-color versions range from $35,000 to $53,800 for turnkey systems with 3M bytes of main memory. All units can upgrade to 9M bytes of memory. Minimum storage includes a 71M-byte disk drive, a 95M-byte tape drive, a DEC Deqna Ethernet adapter, three-button mouse and a 19-in. monitor with 1,024- by 864-pixel resolution.

Significant price drop for Apollo

"My guess is that the DEC system won't be priced lower than the coming Apollo workstation," Yankee's Kellogg said. This would indicate a significant price drop for Apollo, since the firm's workstation that is most similar to the Vaxstation II/GXP costs about $10,000 more than the DEC system. Kellogg also said that IBM's offering may give 70% to 80% of the capabilities of the currently dominant workstations for about a fourth of the price — somewhere in the $10,000 range.

The Ultrix operating system, a version of Unix, was pulled from the Microvax II line last summer because the company discovered problems with the machine's parity-checking capabilities when it ran under Ultrix. The version offered with the new workstation is said to offer University of California at Berkeley Unix 4.2 binary compatibility and 4.3 enhancements in addition to AT&T Unix System V source-code compatibility.

Sun, in a release coinciding with the DEC announcement, claimed that its Network File System protocols will be used by DEC for its systems running under Ultrix. "In general, it's good for us to have someone like DEC making a commitment to Unix," said Sun spokesman John Himes in a phone interview. "DEC is a much larger company [than Sun], and many customers may use that as a deciding factor. But the bottom line is that the workstation market is very large, and there is room for lots of companies," he said.

Senior writer Rosemary Hamilton contributed to this report.

COMPUTERWORLD

To Our Readers:

You may have noticed that some of our sections have changed position within Computerworld. This is part of our ongoing effort to better serve you, the reader.

Our **Computer Industry** section will now begin on the next to last page and will read toward the front of the newspaper. This change has affected our **Classified** section; where **Position Announcements** formerly began the **Classified** section, it will now appear next to **Computer Industry. Classified** will now begin with **Buy-Sell-Swap.**

I am confident you will find that these changes will mean an even better Computerworld. Thank you for your continued support.

Donald E Fagan

Donald E. Fagan
Publisher

CORRECTIONS

Charles Pecchio [CW, Dec. 9] has been named president and chief executive officer of Modern Technologies International, Inc., Suite 302, 656 Bair Island Road, Redwood City, Calif. 94063.

Workstations from Sun Microsystems, Inc. [CW, Oct. 7] are based on the University of California at Berkeley Unix 4.2 operating system.

Honeywell is dedicating 40% of its Information Systems sales force to office and small systems [CW, Dec. 16]. The company will increase volume through indirect channels to 35% over the next five years.

Corona Data Systems, Inc.'s LP-300 printer [CW, Dec. 9] comes with 38 fonts — 16 fonts on the Version 3 diskette and 22 fonts on a supplementary diskette. The system costs $3,395.

Datatek Corp.'s Datatimes optical disk library system [CW, Dec. 16] runs on Basis software from Battelle Memorial Institute's Battelle Software Products Center.

VM Systems Group, a third-party VM software firm [CW, Jan. 6], is located in Arlington, Va.

Relational debate resolution wanted

From page 1

any of the rules. I wondered how that could be. We have implemented what I see as a relational system. It is based on tables, and I can use the relational operators as I know them. I am not sure the final word is in on what relational is, but I don't hesitate to tell others we have implemented a relational system."

The confusion engendered by the controversy has, in turn, spawned reluctance to embrace relational technology, users said. "The argument has definitely slowed people from embracing relational," said Glenn Lukowicz, MIS director with the Speidel Division of Textron, Inc. "Users are waiting for the dust to settle because they feel the debaters are credible and responsible. It seems to me a given that the community at large will take a wait-and-see attitude until the results are a little more obvious. Once the debate over what relational is and isn't is concluded, people will feel more comfortable moving in that direction."

"The debate has certainly added to user confusion," David James concurred. James is manager of data administration and security at Riggs National Bank in Washington, D.C., an IBM IMS shop. "It has made MIS managers leery of going with relational and has certainly impeded acceptance of the technology in data centers."

In the absence of a consensus on what constitutes a relational DBMS, some users have adopted the view that relational, like beauty, is in the eyes of the beholder.

"I think I understand what relational is, and it seems that it's just the vendor's implementation of relational that is at issue," said Richard Keating, DP director with MCO Resources, Inc., an oil and gas exploration and production company located in Houston. MCO runs Applied Data Research, Inc.'s Datacom/DB on an IBM 4341 processor.

"If the end user sees a networked or hierarchical system with relational capabilities as relational, and it functions as I think a relational system should, then I have no problem calling it a relational DBMS," Keating said.

James agreed. "From the user standpoint, it is not so important that the product conform strictly to the model but that it support relational capabilities. Even if the methodology is not absolutely correct, the result is the same."

Users are divided, however, on whether DBMS vendors are misusing the relational tag. "Yes, some vendors are," James said. "Relational has become a hip word, just like user-friendly."

"In terms of the pure model," Keating said, "that's a valid criticism. But if the product really does support relational capabilities, a vendor ought to be entitled to call it a relational system."

Whether the debate over relational is a healthy one is, well, up for debate, users said. "This argument isn't going to impact what I do in the next few years," MCO Resources' Keating said. "I am not at all certain that if Codd's 12 rules were implemented in a product today that I would see any greater benefit. Sometimes it seems that people are drawing a line in the dirt and challenging others to step over it. The debate has generated a lot of heat but not enough light."

But Waybright disagreed. "The debate is very positive and constructive. I think it is good to have people discuss the subject and try to deal with the important issues involved."

What information would users like to see come from the debate? "I'd like to see Codd clarify the practical aspects of his rules," Keating said. "I'd like to know why I need a product that supports six or 12 rules. I seem to be working quite well now without them."

And, Waybright added, "The debaters should avoid the personality issues and try to come up with a better definition of relational and a better set of standards."

TOP OF THE NEWS

NEWS from page 1
on IBM 4300, 370, 3030 series and 3080 series CPUs under IBM's VM/CMS and MVS/TSO, and the voice input device is a peripheral to IBM Personal Computers or compatibles. No ship date has been set.

■

Just when you thought things could not get any worse for Control Data Corp., the company disclosed last week that it has been investigating a major theft of its products from Magnetic Peripherals, Inc. (MPI) plants in Bloomington, Minn., and Oklahoma City. CDC said that in cooperation with the Federal Bureau of Investigation and local authorities, arrests of MPI employees have been made in both cities and more arrests are expected. The investigation, which began early last year, has determined that storage products and factory equipment were stolen and diverted to illegal resellers. MPI is managed by CDC and jointly owned by CDC, Sperry, Honeywell and Groupe Bull of France.

■

The AT&T Information Systems layoff axe fell again last week as the company dismissed more than 1,200 workers. AT&T will stop making data terminals at its Skokie, Ill., facility, eliminating 800 of 2,000 employees. And 464 workers will lose their jobs at the Montgomery Works computer parts facility near Aurora, Ill.

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Third-party developers line up behind Apple's Mac Plus

Enhanced software, boards to be available

By Peggy Watt

SAN FRANCISCO — The announcement of Apple's Macintosh Plus, with its expanded memory and additional peripheral ports, prompted third-party developers to announce they will adapt existing Macintosh products and introduce others that exploit the new machine.

■ General Computer Co. of Cambridge, Mass., introduced a coprocessor board with internal hard disk and a separate file server program, both scheduled to ship this spring.

The $3,195 Hyperdrive 2000 board runs on either the standard 512K-byte Macintosh or the Macintosh Plus, replacing the system's central processing unit with a 12-MHz 68000 microprocessor.

The board includes a floating-point 68010 coprocessor for high-speed mathematical calculations, an additional 1.5M bytes of random-access memory and a 20M-byte internal hard disk drive.

Hypernet, the file server software, enables as many as 32 Macintoshes to share files, storage and programs when linked through an Appletalk network. The cost is $295 per server.

■ Lotus Development Corp. announced an enhanced version of its Jazz integrated software.

New features of Jazz 1A on the Macintosh Plus include hard-disk support without a key-disk requirement, faster disk access, the ability to create larger documents, the ability to accept Symphony 1.1 and 1-2-3 Release 2 files, faster Laserwriter printing and support of the hierarchical file system. Current Jazz users can upgrade for $20.

Apple Computer, Inc.'s Macintosh Plus microcomputer

■ Adopting the new standard interface of the Macintosh Plus, 3Com Corp. of Mountain View, Calif., announced Diskplus, a high-capacity disk drive to be used with the 3Server Expansion Disk, also from 3Com.

The 70M-byte 3Server expansion disk connects directly to the small computer systems interface port of the new Macintosh and allows as many as seven drives to be daisy-chained, providing almost half a gigabyte of disk storage.

Diskplus can be used with Macintosh Plus to boost performance or with Appletalk networks using a Macintosh Plus as a file server.

■ Microsoft Corp., the largest supplier of Macintosh applications, did not introduce any new products but said its earlier Macintosh products run without modification on the latest machine.

■ The desktop publishing program Pagemaker Version 1.2 from Aldus Corp. was released with the Macintosh Plus to take advantage of the machine's enhanced features and those of the Laserwriter Plus.

■ Four Helix products from Odesta Corp. of Mountain View take advantage of the Macintosh Plus' enhanced memory and speed to enable applications to run faster and to allow users to customize records and build original menus.

The data base management/application environment packages include Helix, Double Helix, Runtime Helix and Multiuser Helix for Appletalk networks.

■ Iomega Corp. of Roy, Utah, a leading manufacturer of hard-disk systems in both the Apple and DOS worlds, announced that its family of half-height Bernoulli Box subsystems will support the Macintosh Plus, with shipments beginning in February.

The five systems supporting the new Mac include single-drive subsystems of 5M bytes at $1,795, 10M bytes at $2,495 and 20M bytes at $3,095; the 10-Plus-10 20M-byte, dual-drive Bernoulli Box at $3,495 and the 20-Plus-20 40M-byte, dual-drive Bernoulli Box at $4,495.

Iomega previously announced a 5M-byte Bernoulli Box for the Macintosh and 20M-byte network server for the Macintosh running Appletalk.

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Apple renews bid for office sales

From page 1

and a numeric keypad, more floppy-disk storage and the capability to be expanded by third-party developers.

The $2,595 Macintosh Plus features 1M byte of random-access memory (RAM). Apple said it will be expandable to 4M bytes by replacing the 256K-bit RAM chips with 1M-bit RAM chips but gave no availability date. It has 128K bytes of read-only memory (ROM) with a hierarchical file system and sports a single 800K-byte double-sided 3½-in. disk drive.

Owners of the discontinued Lisa and Macintosh XL computers will be able to trade in those models for a Macintosh Plus with hard disk for $1,498, the company said.

Macintosh Plus interfaces

Interfaces for the Macintosh Plus include a small computer system interface with speeds up to 320K byte/sec., which the firm said can daisy chain up to seven devices simultaneously with two RS-232 serial ports.

John E. Zeisler, Apple's business marketing manager, said that with its planned communications features, Macintosh can find a place in the predominantly Microsoft Corp. MS-DOS-based business world.

"When we say we're going to be IBM compatible, it's not our intent to ship an MS-DOS machine," said Mike Homer, strategic sales technical manager. "Implementing IBM's Systems Network Architecture is not going to be enough," he added. "It's going to require substantial improvement in the human dimension."

Some less optimistic

Some analysts, although impressed with the Macintosh Plus' features, were less optimistic than company officials.

"Mac becomes now, with its increased capabilities, what it should have been when it was first introduced," said Dave Fradin, associate director of Dataquest, Inc., a San Jose, Calif., market research firm. "However, it's two years later and Apple has lost its significant share in the market."

Fradin said he thinks Apple's only chance of grabbing a big share in corporate computer centers is to release an MS-DOS machine itself, following the cue of Tandy Corp. However, there is some consolation that the Mac's easy-to-use interface is being picked up in MS-DOS systems as the shining example of a good business interface, Fradin added.

Written off Apple in business

Maureen Fleming, editor of "Software Industry Bulletin" from Digital Information Group in Stamford, Conn., said she has long since written off Apple in the business world. She noted that MS-DOS machines are gaining in the desktop publishing market, a market that last week Sculley said was made possible by Apple's Macintosh and Laserwriter products. Despite Apple's recent financial results (see story page 146), she said the company is becoming a smaller factor in the overall market.

However, Arthur Young & Co., a Big Eight accounting firm, said it will purchase the Macintosh Plus for its field auditors. Another Big Eight firm, Peat, Marwick, Mitchell & Co., announced it will upgrade all of its 5,500 older Macintosh computers to the Plus level with upgrade options.

For 512K byte-based Macintosh computers, Apple announced the Macintosh Plus Disk Drive Kit for $299, including new 128K-byte ROM chips and an 800K-byte internal drive. When paired with the Disk Drive Kit, the Macintosh Plus Logic Board Kit — which adds the new ports and boosts memory to 1M byte — creates the equivalent of a Macintosh Plus; it costs $599 for 512K-byte systems and $700 for 128K-byte systems. The Macintosh Plus keyboard, which plugs into the place of existing keyboards, is priced separately at $129.

The Laserwriter Plus features seven more families of typefaces than are available in the original Laserwriter introduced a year ago.

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Consultant sees IBM large systems market share slipping

Disagreement on causes of PCM gain, IBM loss

By James Connolly

IBM may be losing some of its overwhelming market share in the large systems business despite the fact that its plug-compatible competitors may be selling fewer systems, and the result could be price cuts for IBM systems.

The unusual growth in market share for plug-compatible manufacturers (PCM) Amdahl Corp. and National Advanced Systems Corp. (NAS) developed as IBM shipped 13% fewer mainframes in the 12-month period ended July 1985 than it did for all of 1984, according to analyst Bob Djurdjevic of Annex Research, a subsidiary of Annex Holdings Corp. in Phoenix.

"It is not so much a case of the PCMs getting market share but that IBM is letting them win it. If the growth of the whole pie slows down, then the PCMs' share goes up even if their own sales slow down," Djurdjevic said. He noted that Amdahl shipped 5.6% fewer mainframes during the 12 months ending in July than in 1984 and still improved its share of the IBM and compatible market from 4% to 4.3%, while NAS jumped from 3.9% to 5.2%. Djurdjevic built his theory on installed base and shipment figures compiled by Computer Intelligence Corp. of La Jolla, Calif.

In a recent interview, Djurdjevic asserted, "First they underestimated demand in the mid-1970s. Now, in the mid-1980s they have overestimated demand. IBM will have to start cutting prices so more companies will buy mainframes, and the PCMs will have to cut their own prices to stay competitive. IBM's losing market share is not good news for the PCMs, although it may seem like good news at first. But from a user's standpoint, this is terrific news."

The analyst's statistics showed IBM with a 92% share in large-scale IBM and PCM shipments at the end of 1984 and a 90.5% share of the $4 billion market in July. Djurdjevic emphasized that the figures were compiled before IBM's 3090 Model 200 processors began delivery in August and that IBM maintains a market share of about 90% using numerous formulas.

Tom Henkel, an analyst with another market research firm, Yankee Group in Boston, maintained that rather than gaining on IBM's market share, the PCMs are losing to IBM. Henkel also differed with Djurdjevic on whether IBM has overextended itself in its production facilities. "I wouldn't say they are overcapitalized. I would say they are probably right on the money. They aren't filling warehouses with 3090s. IBM learned with the 3033 that you don't have boxes full of mainframes waiting for orders."

Defective copies of Dbase III Plus recalled, replaced

By Edward Warner
Computerworld News Service

TORRANCE, Calif. — Approximately 24,000 copies of Ashton-Tate's new Dbase III Plus, a multiuser version of the company's Dbase III data base management system, are being recalled because a manufacturing error prevents the software from running on a local-area network, the company said last week.

Ashton-Tate could give no estimate of how many copies of the program have been sold to end users since the software began shipping Dec. 31. The company said, however, that only about 10,000 of the 33,900 copies shipped so far did not contain the error.

Affected copies bear the serial numbers 2500001 through 2533960. Ashton-Tate said users, distributors and dealers with defective copies will receive free replacements if they request them.

Ashton-Tate said it has already begun manufacturing replacement copies, which are distinguishable by a colored sticker next to the package's serial number.

The problem occurred because a special access code was not entered into either the software's system diskette or the system backup diskette, the company said. Without the code, the software running on a local net file server will mistake users' copies for pirated versions and will not function, said Ashton-Tate Executive Vice-President for Finance and Administration Norman Block.

"Until you get over that problem, you can't run it on a local-area network," Block said. Access codes were not added to each program diskette because "a switch wasn't thrown" when the software was being duplicated, he said. Block said he did not expect sales to be affected and that some dealers may not have to return the defective packages because the "vast majority of the dealer's customers won't be using it in a local-area network environment."

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Once DP manager, Blue Cross DP auditor treads warily

Adjusts to being the man he once avoided

By Charles Babcock

NEW YORK — A few years ago, when Eugene Assante was a programming manager at Empire Blue Cross, Blue Shield, he was wary of data processing auditors.

"In my last year in the job, I wouldn't talk to a DP auditor unless ordered to do so," he recalled.

Now much has changed in his relations with what he used to view as the antagonist. He is the DP auditor. And one of his main goals is to keep to a minimum the friction that sometimes accompanies the need to point out deficiencies in existing systems.

"It's difficult to write these criticisms in a constructive manner," Assante recently told members of the metropolitan chapter of the Association for Systems Management, a New York professional group, as he explained how auditors prepare their reports.

DP auditors are sometimes viewed as meddlers, interlopers or even "spies of management" when they come into a department and check how accurately its systems perform, Assante said.

Nevertheless, at Empire Blue Cross, Blue Shield, where Assante is director of information systems auditing, the role of the DP auditor is a crucial one. The metropolitan New York insurance firm collected $3.1 billion last year in premiums, paid out $3 billion in benefits and handled $4 billion in Medicare claims — all with largely automated systems.

"Not all systems do what they are advertised to do," he noted. It is the job of his DP auditors to examine results from test runs — or sometimes live runs — of a system and see if the results match what was expected.

The process is not purely a random search for errors.

"The best way to tell where there might be trouble is to talk to the user community," he said.

> **”**
>
> ***One responsibility of DP auditors is to check security. Once Assante found a guard, who was supposed to be outside the computer room door, asleep in the computer room.***

For example, some of Assante's 17 auditors would ask claims reviewers if claims are processing correctly. If there is an unusual number of errors, or if the department is having trouble correcting errors once they occur, DP audit sees if it can isolate the problem.

But with more than 100 application systems plus data center and data base management systems, DP audit knows it will look at some systems once every five years. It zeros in on the highest priority areas by asking managers and systems analysts to fill out a form that helps determine how crucial the system they work with is to the business. The most important systems have the highest priority for audits, Assante said.

When systems do not work as expected, Assante and his auditors enter the delicate stage of inquiring why and determining whether the system should be modified.

As a programming manager, he grew impatient with auditors "who were looking at systems strictly in black-and-white terms. There was no consideration of the business situation, the 'Why?' of the way things were," he said.

The audit report ultimately goes to the chairman of the board — who is also chief executive officer of Empire Blue Cross, Blue Shield — as well as to the audit review committee of the board, composed of outside business people, and to the firm's external auditor, Deloitte Haskins & Sells.

Before all these people get to view the MIS department's warts, however, the auditors sit down with the MIS people responsible for the system and try to reach an agreement that deficiencies exist and will be remedied.

If no agreement can be reached, the MIS representative's point of view goes into the report as well as the evaluation, but "We get the last word. We will not take out a finding unless they prove to us it is wrong," Assante said.

The most delicate situation is when auditors are called in to review a new system before it goes on-line. In this case, Assante said, the auditor's role changes from reviewing past performance to anticipating future performance, and the auditor "becomes part of the team."

Sometimes the auditor's findings have nothing to do with programs or code. One of their responsibilities, for example, is to check backup procedures and security. Once, while working for a former employer, Assante found a guard, who was supposed to be outside the computer room door, asleep in the computer room.

Although the computer room is off limits except to authorized personnel, Assante's auditors sometimes find users and customers in it along with approved personnel.

But no matter what happens, the auditor takes his findings initially to the MIS personnel who can do something about them.

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Auditors urged to deemphasize specs, focus on performance goals

By Charles Babcock

NEW YORK — Data processing auditors should be less preoccupied with specifications and controls compliance and more concerned with whether a system meets current and future performance goals, a DP audit instructor told a group of DP auditors last week.

"Start off the audit with a simple question: 'What could go wrong?' " advised Joel F. Kramer, former director of internal auditing for Instrumentation Laboratory, Inc. and now vice-president of the operational audit division of the MIS Training Institute in Framingham, Mass. Kramer conducted a seminar for the New York chapter of the Electronic Data Processing Auditors Association.

By asking some of the questions that a top manager would about a system, the DP auditor is performing less as a compliance auditor and more as an operational auditor — in the parlance of the financial auditing community. And when he functions as an operational auditor, the DP auditor is enlarging his scope of responsibility at the company, Kramer said.

While a DP auditor is typically concerned with whether a system complies with existing controls and specifications, he also should be concerned with whether the existing controls are adequate for today's business conditions.

For example, a DP audit with that question in mind might have caught the inadequacy of the government securities system at the Bank of New York that misplaced data once trading reached a record level, Kramer said. The malfunction cost the bank $5 million in borrowing costs for the Nov. 21 transactions, and the bank said later it had allocated 55 people to solve the problem [CW, Dec. 16].

To forestall such problems, however, a DP auditor must think in terms of "critical business issues" rather than system specifications. For example, Kramer said, a DP auditor should ask, Does this system function as general management intended? Is the exposure of the company to dependence on this system as little as perceived? What are the future implications of the system running this way?

The difference between these questions and a compliance audit is the difference between measuring past performance vs. anticipating future performance, he said.

David E. Frost, president of the Electronic Data Processing Auditors Association and a vice-president of Citibank NA, said the DP audit profession is moving toward integrating the compliance-oriented audits with the more business-oriented, operational audits.

Joel S. Kazin, DP audit manager for the Metro-North Commuter Railroad, said DP auditors need to understand the business relevance of what they are examining. Once they do, they can help other people assume additional responsibility of their jobs by pointing out the implications to the business of what they do.

Oracle Corporation joins Dr. E. F. Codd in asking:

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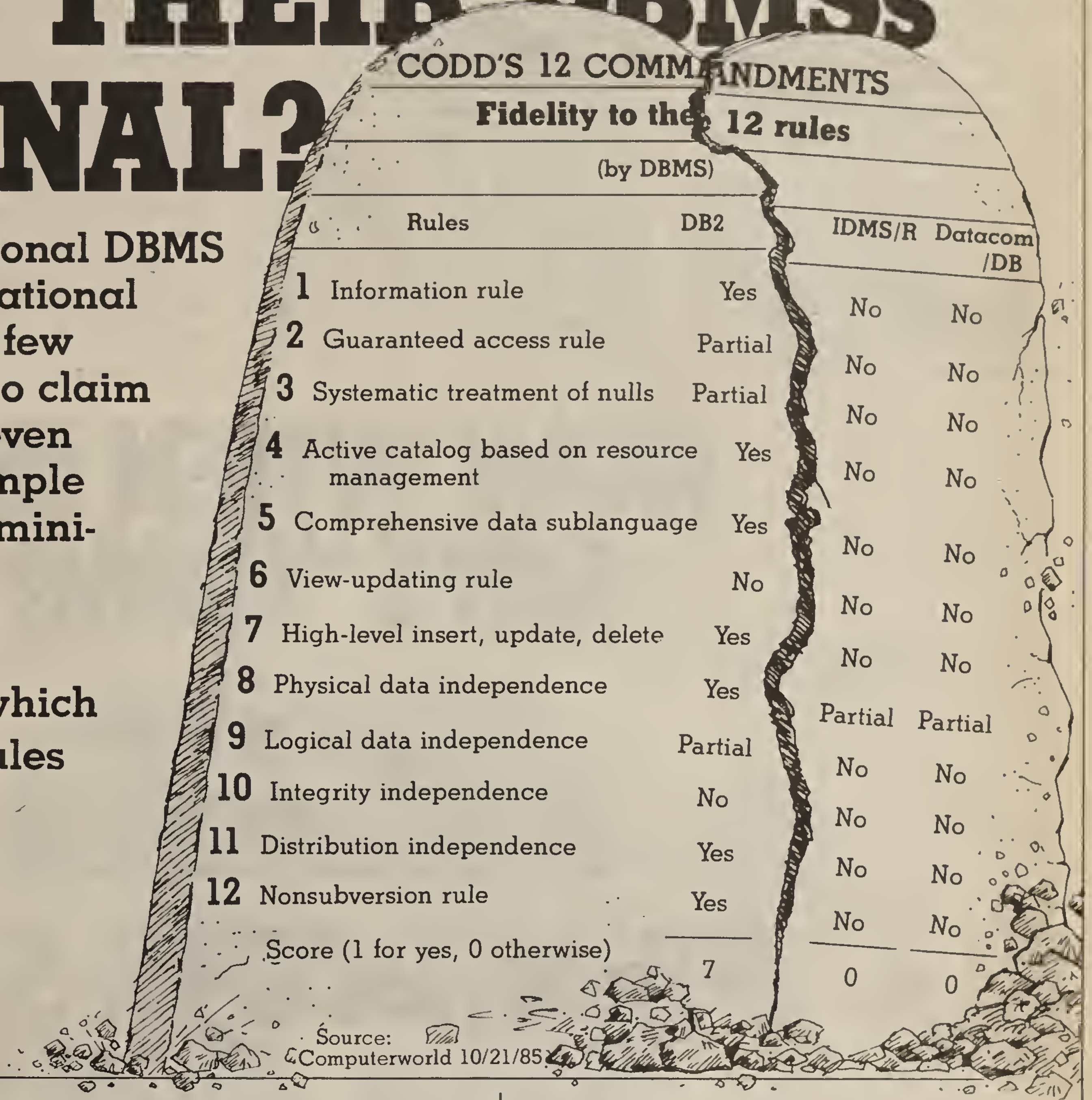
Dr. E. F. Codd, Computerworld, 10/21/85

> "I know of no other DBMS which scores higher on the twelve rules [of fidelity to the relational model than ORACLE]."

Dr. E. F. Codd on ORACLE in his paper, "Is Your Relational Database Management System Really Relational? An Evaluation Scheme," 9/10/85.



CODD'S 12 COMMANDMENTS

Fidelity to the 12 rules

(by DBMS)

Rules	DB2	IDMS/R	Datacom/DB
1 Information rule	Yes	No	No
2 Guaranteed access rule	Partial	No	No
3 Systematic treatment of nulls	Partial	No	No
4 Active catalog based on resource management	Yes	No	No
5 Comprehensive data sublanguage	Yes	No	No
6 View-updating rule	No	No	No
7 High-level insert, update, delete	Yes	No	No
8 Physical data independence	Yes	Partial	Partial
9 Logical data independence	Partial	No	No
10 Integrity independence	No	No	No
11 Distribution independence	Yes	No	No
12 Nonsubversion rule	Yes	No	No
Score (1 for yes, 0 otherwise)	7	0	0

Source: Computerworld 10/21/85

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MIS directors need business savvy, communication skills

Technical expertise now takes back seat in hiring

By Charles Babcock

NEW YORK — The skills most sought after in an MIS director have shifted away from technical expertise toward business savvy and management ability, according to some MIS directors.

A prerequisite to understanding a business is the ability to communicate with department heads; consequently, interpersonal communication skills rank near the top of desirable traits, the placement spokesmen said.

The shift of emphasis has by no means been unanticipated. Critics of information processing in recent years have pointed to a lack of business sense as a frequent shortcoming of data processing managers, and one recruiting officer said the interest in business management skills had peaked and that he was now finding renewed emphasis on technical skills. For the most part the shift is little disputed.

Stephen W. Reilly, for example, said that when he graduated from Columbia University Business School in 1966, he "didn't know a computer from a Model T." He said that general business background, and the ability to communicate with similarly trained executives in other departments, is part of the reason why he is the new vice-president of information services at Ketchum & Co., a $211 million-a-year pharmaceutical supply firm in Westport, Conn.

Reilly learned programming at Arthur Andersen & Co. and learned other aspects of MIS in subsequent jobs. Now he finds much of his time devoted to using his business knowledge to help fashion new systems.

Vita A. Cassese, director of pharmaceutical systems at Pfizer, Inc. in New York, said the nature of her job has evolved over the last several years toward finding ways to gain competitive advantage through technology. One way has been to implement a new office system that speeds the application process for the U.S. Food and Drug Administration approval for new drugs.

Her staff, she said, serves as internal consultants, "helping people get access to information." Many of the people she hires come out of MBA programs with business experience in the area they are going to support.

Technical expertise cannot be disregarded and still plays a strong role in qualifying a candidate for a job, according to MIS recruiters. But it is taken more for granted by employers looking for additional qualities.

MIS director as 'politician'

According to Frederic Rubin, president of the Harvard Management Group, Inc. in New York, the MIS director "has to pull loose ends together, deal with high-level management . . . be more of a politician."

The MIS director must "be a very strong business executive who happens to have skills in technical systems," according to Stephanie L. Pinson of Gilbert Tweed Associates, an executive search firm. She said the emphasis on business skills has been growing over the past 18 months.

Thomas R. Flack serves as assistant controller and director of corporate information systems at ITT in New York. He gained financial skills as an account manager with IBM and continued to develop them in an MIS position at St. Regis Corp. In Flack's view, MIS directors "all have to be businessmen and are part of the business. It's more critical they have a business knowledge than strong technical knowledge, though they should have both."

But there are some who doubt whether the switch in emphasis in MIS manager searches is that much of a change.

"The people with heavy administrative skills are hardest to place. . . . The companies are looking for technical expertise," said Neil S. Meltzer, president of A. J. Paul Associates, an executive recruiting firm.

Meltzer said he thinks the tide has been shifted back toward technical skills by companies concerned about keeping their MIS shops state of the art. "They don't seem too concerned with educating other departments," he said.

While that may be true in some instances, the MIS directors contacted said that was not the case at their companies.

"I spend 50% of my time with other department heads, and in six months it will be 65%," Ketchum's Reilly said.

Providing systems expertise and development across 20 departments at Pfizer is Cassese's job, while Flack said each unit of ITT has an MIS steering committee that draws up plans to provide the technical resources to pursue business opportunities. The MIS implementation plan is reviewed by the top executives who formulated the business plan.

MIS directors need to answer two questions, Flack said: "What do we have to do to support the business?" and "How do we do it?"

"There are plenty of people who can tell you how to do it. It's much more difficult to find people who understand what needs to be done," he said.

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Government DP professionals brace for more budget cuts

Fear reductions will curtail training, slow systems acquisitions

By Mitch Betts

WASHINGTON, D.C. — Computer professionals at U.S. government agencies are bracing for another round of budget cuts that they fear will, at minimum, delay planned acquisitions of major computer systems, curtail training and travel budgets and hurt morale, several MIS executives said in interviews recently.

Major federal budget cuts are expected from the recently passed Balanced Budget and Emergency Deficit Control Act of 1985, also known as the Gramm-Rudman-Hollings bill. It requires a balanced federal budget by 1991, beginning with an $11.7 billion cut for the remainder of fiscal 1986 and a roughly $50 billion cut for fiscal 1987.

Robert L. Ross, president of the Association of Federal Computer Users, predicted that information systems that increase the efficiency of government operations may be spared, but new acquisitions will probably be deferred.

"For the the DP manager trying to graduate from the IBM 360 or 370 world to the 3080 or 3090 processors, it's going to be a tough sell," he said, this despite arguments that the new models are cost-effective and replace obsolete equipment.

One agency information systems executive, who requested anonymity, said the government is facing the same belt-tightening climate that a business faces in an economic recession, but he doubted that DP budgets will be cut deeply. "The federal government will need those information systems to deliver services to the American people."

Some observers are concerned that further budget cuts at the Internal Revenue Service will jeopardize that agency's recovery from the severe computer problems it experienced last year when processing tax returns [CW, Dec. 23]. Robert M. Tobias, president of the labor union that represents IRS workers, asserted recently that the IRS will have $131.6 million less this year than last year and thus will be unable to recover from its 1985 processing disaster.

The budget cuts will mean that "last year's tax filing season will look like a tea party compared with this year," Tobias said at a news conference.

Tobias said the Reagan administration directed all agencies to plan, at minimum, for a 3% budget reduction beginning March 1 to comply with the Gramm-Rudman-Hollings bill for the current fiscal year.

Army wins large GPO contract

By Eddy Goldberg

WASHINGTON, D.C. — A contract to automate the processing of millions of pages of U.S. Army manuals was announced last week, and analysts said the multimillion-dollar project will spark commercial acceptance of the fledgling electronic publishing technology.

The five-year contract announced by the Government Printing Office (GPO) was awarded to Electronic Data Systems Corp. (EDS), which teamed up with Interleaf, Inc., a Cambridge, Mass.-based start-up that has forged an early lead in selling systems to automate the writing, production and revision of documents.

"A lot of corporations will look to the fact that the government is giving one of the electronic publishing start-ups such a large order," said Jose Ramos, publisher of "WYSIWYG," a newsletter on the electronic publishing industry. "This could be the green light that will result in the industry growing to $70 million or $80 million this year." Ramos estimated current annual revenues from Interleaf, Xyvision, Inc. and Texet Corp., three industry leaders, to be approximately $35 million.

Valued at $310 million, the project will involve coordinating text and artwork into composed pages. When completed, the automation will involve "printing and binding approximately 26-million page impressions every business day from a publishing base of well over one trillion bytes," the GPO said.

Jonathan W. Seybold, editor in chief of "The Seybold Report on Publishing Systems," said, "The thing that's attracted people to Interleaf has been its ease of use and its speed. Another factor is the portability of the software, which can be used on other, nondedicated workstations."

The victory, however, is not yet ironclad. AT&T Technologies, Inc. has filed a preaward protest with the General Accounting Office, alleging irregularities in the bidding process, but EDS has received a work order and funding. Xyvision, an Interleaf competitor, is supportive of the protest, a company official said. Xerox Corp., also involved in the final competitive stages, has filed a letter of interest.

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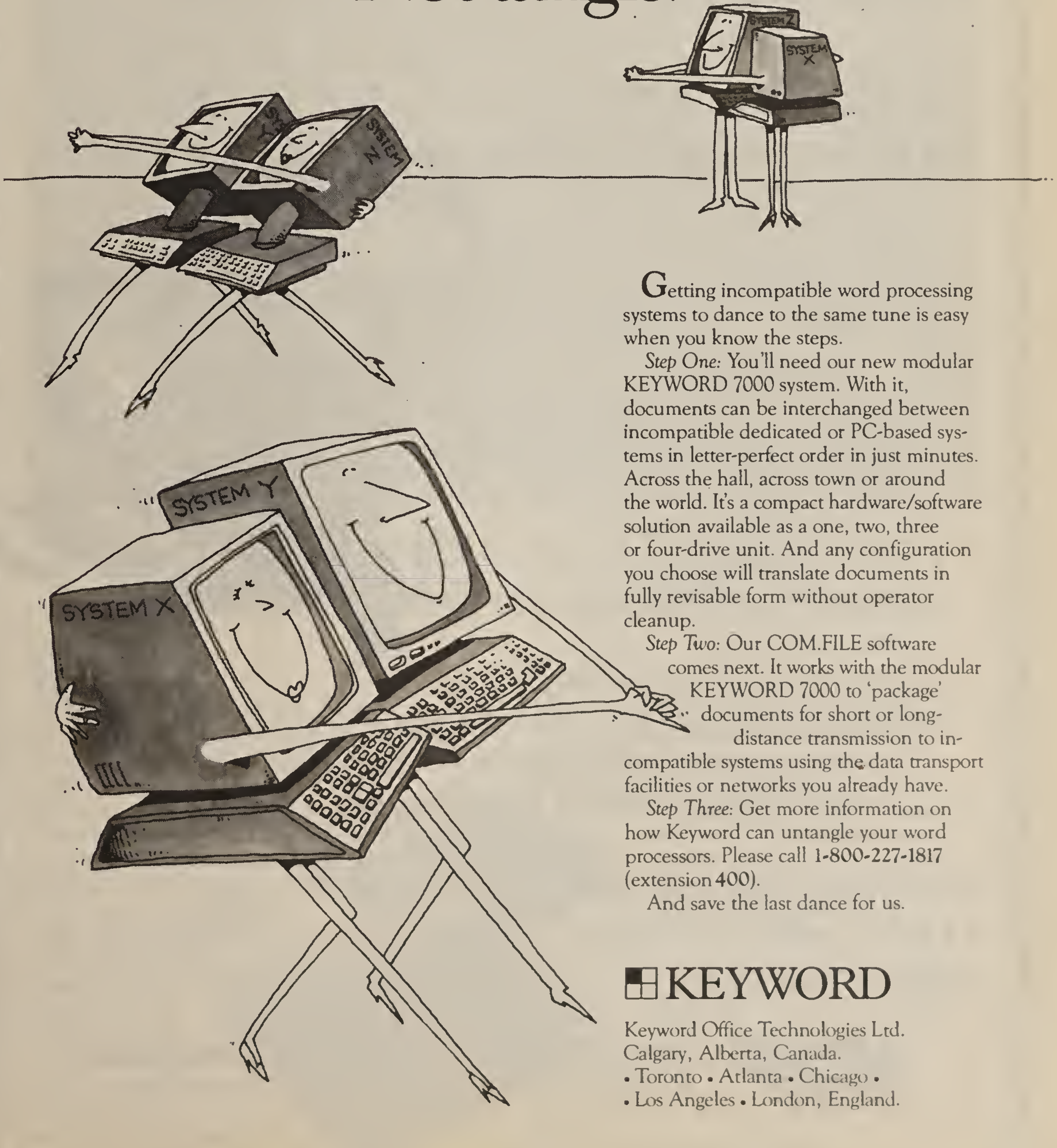

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Information systems sharpen retailers' competitive edge

Harvard prof teaches benefits of technology

By Charles Babcock

NEW YORK — Businesses must take an aggressive approach to information systems if they want to remain competitive in the next few years, Harvard Business School Prof. F. Warren McFarlan warned executives last week at the National Retailers Business and Equipment Convention.

Rapid changes in technology lead to rapid "shifts in the balance of power, in the business relationships" between competitors, according to McFarlan, who has studied the role of information management in modern business.

The automobile industry, McFarlan said, is mired in distribution practices that worked in the past and has not effectively learned how to use information as a strategic weapon.

For example, if an auto dealer analyzed readily available information, he would know that McFarlan and his wife are about to buy a new car and even what type of car they are likely to buy. Yet no dealer has sent the McFarlans a colorful brochure about new models or contacted them to offer a test drive.

Analyzing agency statistics

By analyzing statistics at the Massachusetts Registry of Motor Vehicles, an auto company could surmise that the McFarlans are likely to buy a new car every 5½ years, he said. And, by analyzing readily available U.S. Bureau of the Census data on his neighborhood, the dealer could get a good indication of the household's income.

By combining these two facts, the dealer could target McFarlan for a sales pitch directed toward the type of new car his family was likely to buy, he noted.

Although no automotive company markets cars in this fashion today, two have undertaken crash development of programs to get such a marketing system in place, McFarlan said.

Perhaps one of the best known examples of a competitive advantage gained through an information system is American Airlines Saber reservation system, which McFarlan cited to buttress his point.

Some observers say Saber does not offer American Airlines an overwhelming advantage because flights from all airlines are included in its listings, which appear on terminals in travel agents' offices. McFarlan cited figures to the contrary.

When McFarlan called a travel agent to inquire about a flight from Boston to New York, he was informed about two American Airlines' flights close to the time he wanted and several other airlines' flights, none of which exactly matched his request.

When the agent delved deeper into the Saber system, a second screen yielded no flight that he wanted. But a third screen finally listed the flight closest to the time he wanted from a major competitor of American Airlines.

The Saber system serves 47% of all travel agents, and they make 90% of all reservations off the first screen, McFarlan said, citing statistics that have emerged in complaints filed by the airline's competitors.

American Airlines' staging of the system to favor its own flights is so effective, McFarlan claimed, that whenever Saber replaces a competing airline's reservation system in a travel office, American Airlines will show a 30% increase in ticket sales at that office, he said.

One new technology that could undercut today's growing reliance on keyboards and personal computers is voice-activated typing based on artificial intelligence.

Three start-up companies, one of them 80% underwritten by Wang Laboratories, Inc. and Xerox Corp., are developing voice-activated typewriters, and one has achieved 98% accuracy, McFarlan said.

Two retailers at the convention, sponsored by the National Retail Merchants Association, explained how they have used new technologies to gain at least short-term competitive advantages.

Speeds checkouts, increases accuracy

Robert Frey, vice-president of MIS at Bloomingdale's in New York, said his company had been able to speed checkout times and increase the accuracy of its sales information by using IBM Personal Computer XTs with touch-sensitive screens at the checkout counter. The clerk goes through a series of screens, touching the appropriate item to indicate class of goods, vendor of goods and items purchased from that vendor.

But the procedure has yielded unexpected results. Instead of making 89 keystrokes to complete a sale, a clerk needs to make only 12, reducing the chance for misidentification and error. And customer checkout time has been reduced from six minutes to one minute, Frey said.

Thomas Jeffery, information systems vice-president of Lechmere, Inc., in Woburn, Mass., said his company has installed IBM Series/1s in its catalog showroom stores to reduce paperwork and speed customer checkout.

With a retailing software package that the chain has extensively modified and named the Laser system, store clerks can tell customers whether the items they want are in stock, send a pick order to the storeroom and process the customers' orders from any one of 32 sales stations in the store.

"Usually the merchandise arrives at the pickup desk in advance of the customer," compared with a wait of several minutes previously. The checkout process has been accelerated so much that "we are able to get by with one less acre of parking than we needed before," Jeffery said, and information is now available in each store that formerly had to be reported back from headquarters.

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Cost overruns plague California DMV automation project

Snafus may bring state bill to $58 million

By Maura McEnaney

SACRAMENTO, Calif. — California officials are grumbling over a $35 million cost overrun on a five-year automation project at the state's Department of Motor Vehicles (DMV).

The four-phase, multimillion-dollar project was launched in 1978 to automate the registration and driver's license processes for more than 17 million registered drivers in the state. The massive computer system was also designed to automate the collection of approximately $2 billion in DMV-related fees each year.

But problems with installation, training and planning brought excessive delays in the DMV automation project, pushing some phases of installation behind schedule by as much as 36 months.

California assemblyman Richard Katz reported the progress of the DMV's automation project to members of the state's Transportation Committee recently. In a 15-page report, Katz predicted that the automation project will eventually cost the state approximately $58 million in increased expenditures and unrealized savings during this decade.

The overrun appears to be growing almost daily. According to Katz, in the three months since the legislature held a joint hearing on mismanagement problems within the DMV automation project, the cost overrun grew by approximately $3 million.

A more conservative estimate

DMV automation project manager Gary Nishite has been with the project since its inception. "There is a cost overrun, but it's not $35 million," Nishite said. "I would guess it is somewhere between $15 million and $20 million."

Since 1979, the DMV has installed a distributed network of computers in 98 of its 157 field offices. That net consists of 200 IBM Series/1 minis, 1,500 IBM 7485 terminals, 800 Mannesmann Tally Corp. 1605 printers and two IBM 4341 machines.

In September, the department concluded the second phase of the project to automate the automobile registration functions. Completed 13 months behind schedule, Phase II included installation of 100 IBM Series/1s linked via a communications processor to an IBM 4341 mainframe in the DMV's Sacramento headquarters. The system has the capacity to support up to 1,600 new IBM terminals, 800 printers linked to five Sperry Corp. 9080 systems as well as existing telecommunications services of California law enforcement and government agencies.

During the 13-month installation process, the DMV's troubles blossomed, and what followed was a series of snafus that Nishite recalled with some reservation.

First, delays in data line installations needed for the system put the DMV project on hold for up to six months at some offices.

Matters were further complicated by the DMV's training program, which attempted to train employees before the technology was even close to being installed. Many employees had to be retrained on the equipment months later. Training schedules were set back even further when DMV managers balked at losing employees to training time, Nishite noted.

With the implementation of a new computerized system, the DMV had hoped employees would be performing several job tasks at once, completing DMV transactions within about five minutes. But, as Nishite and others at the department soon learned, employees did not catch on as quickly as was hoped. Automation meant teaching workers aspects of the job they never had to learn before — a training requirement that previously went unconsidered.

One more complication — a budgeted reduction in keyboard operators — eliminated job functions that the department still needed to perform. "We were cutting the key data entry staff before we could," Nishite said. "We then had to replace those permanent positions with some temporary help, which accounts for some of the overspending," he said.

Overtime costs at the DMV will total approximately $4.8 million this year — 10 times the amount the department spent in 1982, Katz said.

The problems with Phase II have pushed back the scheduled completion of Phase III from September 1984 until some time in 1987, the DMV estimated. "We made a decision that it's not wise to try to do too many things at one time," he said.

The third phase, scheduled to begin in February, will add about 1,000 terminals and 600 printers to the DMV offices throughout the state. It will fully automate driver's license applications, providing DMV employees with updated information on an applicant's record.

Nishite, however, is willing to put past problems behind him. He said he believes Phase III of the project will not be nearly as troublesome. "We've reestablished our training plan based upon some of the pitfalls we faced. We've lowered our expectation levels on the learning curve, and our planning parameters are better," he said.

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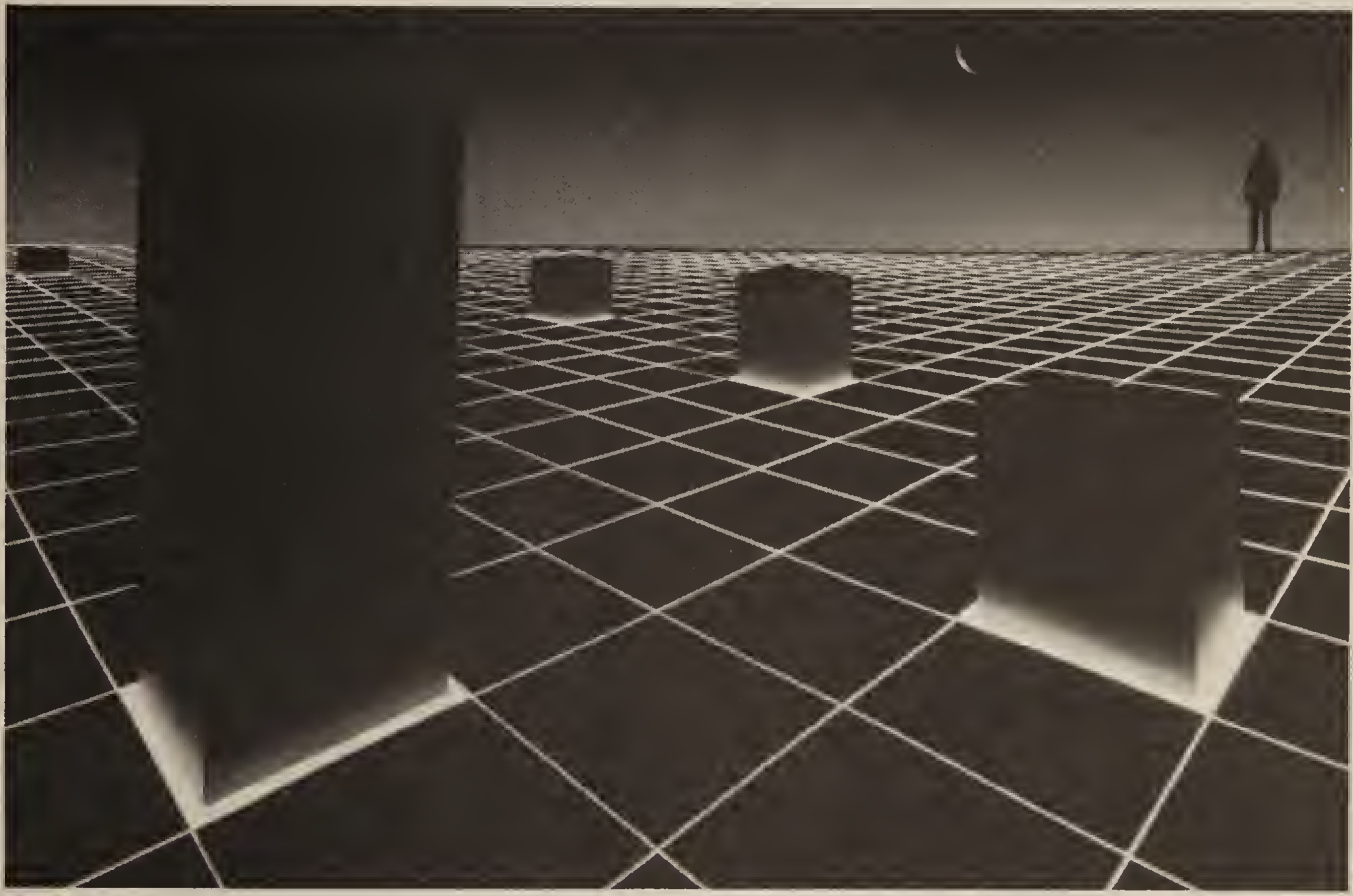

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VIEWPOINT

EDITORIAL

Norris departs

The curtain closed on another act in the continuing Control Data Corp. melodrama with the resignation last week of Chairman and cofounder William Norris, who moves on to the presumably ceremonial role of chairman emeritus. Although Norris will no doubt continue to influence his handpicked board of directors and the executives with whom he has worked the past few years, he is gone from the daily scene, and the computer community must mark this passage.

Norris and CDC embody most of the elements of the history of the computer industry in the U.S. Norris' original company was Engineering Research Associates, founded after World War II. ERA was acquired by Remington-Rand, which produced Univac, the first commercial computer, and then merged with Sperry Corp. In 1957, Norris left Sperry-Rand to help found CDC, the industry's first-ever publicly financed start-up.

As its current financial reversals mirror those of other shakeout victims, CDC's early successes were forerunners of computer industry overnight sensations that were yet to come. The new company provided one product, large-scale computers, for one market, engineering and scientific applications. Norris had effectively identified a market not already dominated by IBM and moved in with a high-quality product. CDC subsequently used the same strategy in diversifying into time-sharing services, third-party maintenance and storage peripheral products.

But there was another dimension to CDC beyond the development and sales successes, and this was supplied by the unique personality and interests of its founder and president. Norris, dedicated technocrat, was driven to prove that technology could solve humanity's woes in countless ways, and he devoted himself and his company to an array of business opportunities that coincided with social good. This activity was epitomized by Plato, Norris' computer-based education project that took more than $900 million and 20 years to develop and is reportedly just beginning to turn a profit for CDC.

Norris' intentions were always the best. His failure may have been trusting too much in technology to solve social ills while giving so little heed to the associated economic and market realities — CDC was maligned on Wall Street and moribund in Minneapolis. At the same time that investors were cooling on the president's technoaltruism, CDC was failing to respond creatively to the rise of office automation and microcomputing or to the softening market for two of its staples — mainframe computers and remote time-sharing services. CDC was certainly not the only old-line computer company to miss out on the micro revolution, but Norris' outspoken iconoclasm made its failings all the more dramatic.

CDC's strategy now is to throw the throttles into reverse, return the company to its core business and sell off extraneous operations. The strategy may not work. Refocusing will be awkward, sales of divisions difficult, and cash will be in short supply. Chapter 11 could beckon.

Whatever CDC's fate, we would not want Norris to be painted with the same brush as the now-struggling company he founded. A word of praise is in order for a man who judged corporate success to be more than a fancy bottom line.

RISC
HEWLETT PACKARD
TRUST ME. IT WORKED FINE IN THE WIND TUNNEL.

LETTERS TO THE EDITOR

IBM executive denies charge that Big Blue dodges questions

We were puzzled to read the observation in the Dec. 4 editorial of *Computerworld Extra* that journalists do not expect IBM "to answer a direct question."

Computerworld Extra interviewed three IBM executives who answered scores of direct questions for that edition alone. And in 1985, we responded to more than 350 inquiries from *Computerworld Extra.*

In 1984, IBM responded to tens of thousands of media inquiries and granted hundreds of executive interviews. We're well on the way to surpassing those numbers this year.

Although no one could reasonably expect us to answer questions seeking proprietary information, we do answer many thousands of questions in a timely, responsive way.

Peter F. Judice
Director of Information
IBM
Armonk, N.Y.

Varieties of multiple-session tools come of age for micros, mainframes

I read with some interest the article on multiple-session VTAM software "Multiple-session software emulates a messy desk" [CW, Nov. 18].

My interest stems from a project I managed that developed a multiple-session manager for our in-house users, initially the bond traders but now every computer user in the firm. Our internal name for this product is Session Manager, an enhanced version of which is now marketed by Duquesne Systems, Inc. under the name of Terminal Productivity Executive (TPX).

It is clear that the concept of multiple sessions — and soon, for TPX, windows — is one whose time has come. The user orientation of the personal computer revolution has had the salutary effect of forcing a similar perspective upon the sometimes unwilling managers of the "fortress mainframe."

In our own case, we would simply have been unable to get our users to accept applications of acknowledged benefit without Session Manager. As it is, we have made significant strides in leveraging the revenue side of the business with the resources of the computer.

Although many users might prefer a personal computer application, in our environment neither the power nor the tools currently available are adequate to support the users' needs, not to mention the thorny issues of shared update data bases and data base section transfer to real-time applications over long-haul communications.

Although it is natural for me to prefer TPX and to defend it instinctively, it is not my intention to do so. Nevertheless, I would like to comment on a number of following points made in the article:

- Session limit. A limit of 16 was mentioned; TPX has no restriction whatsoever.
- Administration. Morgan Stanley & Co. has 2,600 active users in-house and more than 40,000 sessions defined, and we do not require a full-time administrator. We have a group of people responsible for user interface, and TPX administration is just one of its many duties.
- Multiple-user identifications. Although IBM's TSO has a restriction of only one session per user ID, multiple-user IDs are not a problem. The real point, however, is that TSO is not where the action is. The people that really matter are those who use CICS and APL where no such restriction exists.
- Multiple sign-ons. TPX automatically signs on the user to a plethora of sessions. This, in fact, is one of its strengths. This feature has greatly reduced the complexity seen by the user. TPX has a script language, ACL, that allows it to emulate keyboard entry exactly. Morgan Stanley uses this facility to stress test applications in a manner analogous to a teleprocessing network simulator.
- Reliability. Although it is true that all traffic of a particular user is controlled by one region, we have multiple regions to reduce the impact of a failure and multiple regions that cooperate in providing a single image to the network but whose existence adds no burden to the system. We have gone to great lengths everywhere in our system to eliminate monolithic structures so that a single component failure will affect as few people as possible. Many system component failures are masked entirely from the user by TPX so the user's view of reliability is improved.
- CPU and paging. It is simply not the case that TPX or any of its competitors uses a significant amount of the mainframe nor are page faults a problem. MVS manages this problem quite well, and memory is inexpensive these days, especially

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WEEKLY.

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VIEWPOINT

The myth of Ada as Esperanto

By Charles P. Lecht

In a recent Reuter release, we are provided with yet another story of why the U.S. Department of Defense's 1984 adoption of Ada as its standard programming language was a wise decision.

We are told that Pentagon sources are optimistic that "Ada will save more than $1.5 billion per year when all branches of the service make the switch to it." Analysts said the Ada decision could result in sales totaling $15 billion per year to the military alone by 1990.

All these good things will happen, according to the Reuter release, because Ada is considered faster than any predecessor and because "strict controls eliminate the need for syntax checks that other languages need before running a program."

As if this weren't enough to convince Aunt Betty in Cascade, Mont., of the wisdom of our investment in Ada, the release said, "Even more important, it can enable a program to transfer to different computer models without being rewritten. This ability, known to experts as portability, makes it akin to the universal artificial language Esperanto."

We are encouraged to get on the Ada bandwagon by being told that National Aeronautics and Space Administration has chosen it for programming software for a space station to be launched in 1992 and for an advanced air traffic control system presumably by our Federal Aeronautics Administration, which is made up of avowed Fortran fanatics.

LECHT ON SCIENCE

> *Ada's choice as an artificial language standard has about as much chance of survival as did Esperanto.*

As if this weren't enough to obtain our conviction that the Ada decision was a wise one, we are told that NATO as well as the British, West German and Italian armed forces have also chosen the language, although we are not told for what. And, for those cynics that doggedly hold the opinion that whatever path the military follows, they should be on another one, we are treated to the assertion that industry officials believe sales to the commercial sector will eventually outstrip military applications. That's more than $15 billion dollars per year if it happens by 1990.

The Reuter release originated in none other than Boston, home of a lot of DOD-subsidized Ada development. I read it in *The Japan Times* under the headline, "New computer language to open major market." How many papers and magazines picked it up between Boston and Tokyo is unknown to me, but I'll wager a lot.

Ada's choice as an artificial language standard for all applications development on computer systems has about as much chance of survival as did Esperanto when it was proposed as a language standard for people. What's particularly disturbing about the choice of Ada as the one and only computer language is the exclusiveness and importance this assigns to it.

We cannot deny that Ada provides a powerful and rich command repetoire for certain kinds of applications in weapons development. To deny that it has commercial application in fields such as air frame simulation or nuclear plant design would be a mistake. But the suggestion that it is a computer Esperanto is as ludicrous as this comparison suggests.

Esperanto failed to command the attention of anyone but the people who created it and, in its heyday, was identified along with socialism as infecting its adherents with a possibly fatal disease.

The assertion that Ada is faster is ridiculous. Faster than what? Getting on the air with a program quickly so that results can be obtained swiftly certainly isn't helped by using a language that demands a rigid adherence to strict controls in how things are expressed.

True, this makes it easier for the computer to translate user needs, but it makes it commensurately harder for the user to express these. In this day and age when personnel costs are soaring and computer costs diving, we want to lessen the demand on users by off-loading their chores to machines. That's what automation is all about, and all contemporary language development research has this objective.

The portability issue is nonsense, too. Today, we may obtain portability through hardware innovations, which are proving to be less expensive than special-purpose compilers. This wasn't the case when the DOD

See **MYTH** page 18

Lecht is chairman of Lecht Sciences, Inc., a New York-based think tank specializing in computer and communications technologies. He divides his time between Tokyo and New York.

Disaster planning for cash flow emergencies

By Walter F. Cuirle

You read about it, you met other people in the business who had to go through it, but you never really believed it might happen in your shop.

But it did. Word came down that there will be a general cutback, and MIS is not exempt. There you are with your personnel list and budget, and the pencil feels like an ax.

If the decision has actually been made and the directives have been issued, it's probably too late to do anything about it this time.

The problem is not that this has happened, but that it caught you by surprise. You were given no choice and no opportunity to look for alternatives. You have no options. You probably were left with none because your management felt that they had none. So the thing to do is offer them options. In advance.

Look at the situation from the point of view of the business of the company as opposed to the business of MIS within the company. The key consideration for any company is return on investment — the number of dollars that walk in the door.

In most companies, MIS is largely an internal operation. Dollars walk out the door in the name of MIS to buy equipment, services and, especially, personnel because MIS is very labor-intensive. Dollars don't enter the company through MIS in such an obvious fashion. The chargebacks you make to other departments represent, from your point of view, a justification of your expenditures.

From the point of view of your client departments, a chargeback is justified if the amount they pass on to you is less than the amount they would have to spend to do the same thing by other means. But from the point of view of corporate management, the real question is, Done inexpensively or not, done well or not, does this project help or hurt the return on investment?

MANAGEMENT MATRIX

That question is one that you cannot answer unless you know the corporate business plan and how your clients' projects fit into that plan. All too often, MIS planning is just concerned with capacity planning: Given the three current projects from this division and the five from that, here is what is needed to maintain the status quo, here is what is required to expand.

But if that is as far as your planning for the MIS budget goes, you have corporate management that is left with no options when times get tough. Remember that MIS is justified largely in terms of money saved — not money made.

If times get hard, corporate management has to cut back on the amount of real money that is going out the door. At times like that, the complex interlocking construction of potential savings and chargebacks are a Gordian knot. And the simplest way to solve that kind of problem is with an ax.

If corporate management sees no other clear path to stanching the flow of cash out the door, the quickest and most convenient solution is merely to reduce the number of people. It's the financial equivalent of amputation and cauterization — brutal, inelegant but quick and effective. With fewer people across the board, everyone moans and everyone wails but everyone adjusts.

They adjust by uncovering the marginal projects and killing them on their own, one by one. Eventually, the potential savings become real.

But if the net effect of all this agony is just to cancel marginal projects and pocket the savings, shouldn't it be possible to take a more rational and less painful route to the same end?

Yes, but you can only do that if you know the impact of the projects on the corporate plan and if you know in advance the amount that will be saved if the project is canceled. This is how those two points fit together — plan for cutbacks in such a way that you can offer options to corporate management. Do it in advance while times are good, and you will avoid shock and get options should times get bad.

There are certainly several ways to skin this cat, but let's look at just one. Rather than set up your planning in terms of current systems as a group plus projected systems as a group, try setting things up in terms of individual projects. For each project, whether it is ongoing or projected, set up your usual financial categories of equipment, services, personnel and so on.

What you want to aim for here is the fixed and recurring costs for each individual project for the year. Now, add one more column. Call it "triage status" if you like, because that is how it will be used. Force yourself to put each individual project into one of three categories: the company must have it to survive; the company can do without it for a while, but it must be done eventually; the company realizes only marginal benefits, if any.

The key concept is that you are categorizing projects according to their benefit to the company, not according to the client department.

This does not mean that you go back to your client department and tell them that their project is a Class 3 marginal so it doesn't deserve to get done. What it does mean is that you equip and staff that project with an eye to its untimely demise. You track it as how much has been spent on it and how much will be saved if it is killed.

This last point is very important in this kind of financial disaster planning. You must know, at any time for every project, what the impact will be on corporate cash flow if that

See **PLANNING** page 18

Cuirle is a senior associate with Nicholas DeMaio Associates in Bryn Mawr, Pa.

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VIEWPOINT

Multiple-session tools come of age

From page 16

with the Sierra series.

■ Response time. The amount of time added by TPX to the application response time as a result of the increased path length for each message cannot be measured at the end-user terminal. We run all of our 3270 control units on point-to-point 56K bit/sec. lines, and the human eye cannot detect a difference.

Furthermore, TPX was built by people with a great deal more experience with IBM's Systems Network Architecture than with most VTAM applications, including CICS and IMS. For a number of applications, response time is visibly improved by TPX because of its superior design.

The problem with the preferred environment approach is that large shops simply cannot count on being able a priori to determine even heuristically where that preferred environment might be. The advantages of flexibility in session establishment and user satisfaction far outweigh what is inconsequential resource consumption.

George Ross Fisher IV
Vice-President
Morgan Stanley & Co.
New York

The myth of Ada as Esperanto

From page 17

set out on its search for a programming language standard more than a decade ago.

To bring in such a standard now, just when we can solve portability problems without it, cannot help but limit technological progress. Because Ada is a language for scientists, and because the majority of users of computer systems are not scientists, assertions that its sale to the commercial sector will eventually outstrip military applications are astonishing. A review of scientific vs. business language user statistics shows that the latter outnumber the former by seven to one.

Today's research in special-purpose computer languages is providing fantastic results, the kind that reflect our desire to remain human while we talk to machines to obtain their benefits. We can only hope that this real progress will not be hampered by those perpetuating the Ada myth of an artificial language that is a computer Esperanto.

Planning for cash flow emergencies

From page 17

project is canceled.

Does this mean that you will never have to cut back on personnel? No, it doesn't. What the method tells you is what your mix of salaried staff and temporary contract staff should be.

You want the total work hours planned for all of your Category 1 and 2 projects to equal or exceed the labor resources available through your salaried staff. Cover the rest of the labor needs with contract staff; they are temporary by definition and easier to lay off than your core group.

The whole concept is similar in principle to the kind of planning you already do for disaster recovery. You should have a plan in place that details what you will do if there is a fire in the computer room. Here, you are planning for a cash flow emergency in the same way.

Do it ahead of time, and do it with the active participation of your management while the atmosphere is calm.

But, just as with your physical disaster plan, the important thing is to do it now.

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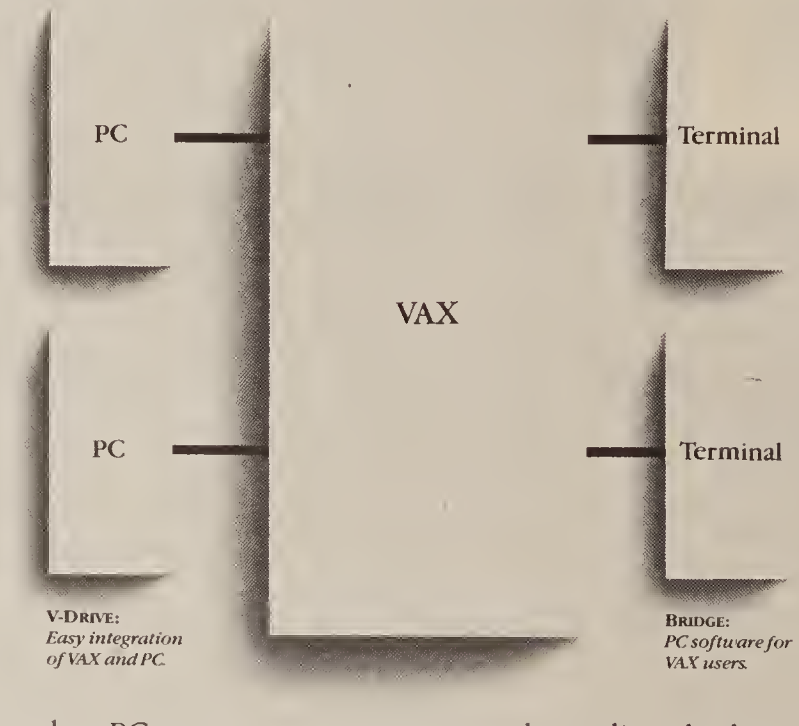

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MICROCOMPUTERS

SMALL TALK
Eric Bender
CW Senior Editor

DBMS tools: Not natural yet

Natural language still isn't a natural for data base management systems, most vendors and industry analysts agree.

"Natural language is cute, and if you spend a lot of time on application development and develop a good application lexicon for a particular file, it can work," remarked David Feldstein, vice-president of Information Builders, Inc.'s micro products division. "But if you need to be specific, language is a poor way to do it. You need structure."

"We continue to evaluate various natural language capabilities," said David Hull, Ashton-Tate's director of product marketing for data base products. "We haven't seen any that deliver the kind of benefits we understand our users want."

Micros pose a particular challenge for natural language, of course, because of CPU and memory limitations.

But other, deeper problems are well illustrated by sitting a human data base expert in front of a computer and giving him an information request, suggested Paul Cubbage, software analyst with Dataquest, Inc.

Even with real intelligence sitting there, this is not an easy process, Cubbage remarked. "And a computer will not look at you and see a puzzled expression on your face."

Most attempts to deal with natural language interfaces produce the same reaction, Cubbage said: "God, quit talking to me and give me the answer."

"As someone once said, natural language is like trying to scratch yourself with gloves on," Alpha Software President Richard Rabins said. "You want to

See **DBMS** page 24

Users applaud Base SAS

Product leads new micro family of SAS software

By Rosemary Hamilton

Base SAS — the first piece of SAS Institute, Inc.'s PC SAS System, which will offer statistical, data management and other capabilities on IBM Personal Computers — has won positive reviews from early users interviewed by *Computerworld.*

"We see it as having lots of potential," said David Moazed, programmer analyst at Glaxo Co., a pharmaceutical concern in Research Triangle Park, N.C. "We've been pursuing it for as long as we were aware it was going to come out."

Overall, users had few complaints about the product. Of the six users interviewed, two said they received error messages inconsistently when they ran the system with the recommended 512K-byte memory configuration.

Only one customer balked at the annual license fee of $2,500, which allows users to make up to 50 copies. "If you make 50 copies, the price is fine. For us, the price is exorbitant," said Hannen Liu, director of biometrics at Serono Laboratories, Inc. in Randolph, Mass. Liu said he plans to make only one additional copy.

Announced last year, the PC SAS System is geared toward application developers and information managers at companies that rely heavily on statistical data. Modules range from the base product — which provides data management, report writing and full screen editing and windowing tools — to a program for forecasting and financial modeling.

Traditionally, SAS Institute has been a major statistical software vendor for users in mainframe or minicomputer environments. With its new product line, SAS is apparently responding to a growing need of its customers. Users at some large SAS installations said the software puts more power on desktops and, therefore, lessens the burden on the host computer. Users at smaller sites, however, said it is helping them switch from a mainframe time-sharing environment to an in-house personal computer-based system.

Having received the Base SAS package in October, most of the users interviewed said they were just coming up to speed with it. Furthermore, because Base SAS forms the foundation of the SAS System,

See **USERS** page 23

Net RM/Cobol compilers debut

By Eddy Goldberg

ROLLING HILLS ESTATES, Calif. — Ryan-McFarland Corp. has released network versions of its RM/Cobol and RM/Cobol-8X compilers.

Configured to run under IBM PC-DOS 3.1 and the IBM PC Network, the new versions allow linked users of RM/Cobol and RM/Cobol-8X files to share data without using third-party interfaces or switching operating systems.

"With this implementation, all users have to do is look for multiuser software written in RM/Cobol, take it and run it," according to Peter Ziebelman, director of product marketing at Ryan-McFarland.

"For instance, if a user buys an accounting package written in RM/Cobol to use on an IBM Personal Computer AT, that user now can transport that application package to the PC Network without having to recompile it or buy source code. We make the interface transparent, so a user can bring application software from multiuser systems to the PC Network," Ziebelman explained.

The network versions of the two compilers are available for the IBM Personal Computer, Personal Computer XT, AT and compatibles. Each is available in two versions, Fullsystem and Runtime.

The RM/Cobol Fullsystem is priced at $1,250 for up to 5 users, while the Runtime version costs $500. The RM/Cobol-8X Fullsystem is priced at $1,500, while the Runtime version is $600.

INSIDE

Tecmar introduces an expanded memory board and an input device/**22**

NEW THIS WEEK

- Ryan-McFarland upgrades RM/Fortran
- PC Technologies offers its 286 Express accelerator card
- For more on these and other new products, see pp. 83-109.

INSTANT ANALYSIS

"We're not talking to MIS about network sales; we're talking to end users. MIS is already swamped because they're trying to support single-user stations."

— **Elliot Goldberg, president, Goldata Computer Services, Inc.**

Computer Associates offers micro version of CA-Financial Planner

By Douglas Barney

JERICHO, N.Y. — Computer Associates International, Inc. this month announced the release of CA-Financial Planner/PC, a microcomputer financial modeling package that is compatible with the firm's mainframe financial modeler, CA-Financial Planner.

The $795 CA-Financial Planner/PC parallels the syntax of the mainframe version and allows for the distribution of financial modeling and report development to users on IBM Personal Computers and compatibles. "A model that is created on the microcomputer can be tested on the micro and then uploaded and used with very little to no modification whatsoever," according to product manager Gary Layton.

Computer Associates expects that some users will switch from spreadsheet programs to financial modeling programs that provide audit trails.

Unlike the mainframe product, CA-Financial Planner/PC does not support "what-if" capabilities. But within 60 days, the product will be able to present 500 different scenarios, Layton said.

The financial tool can interface with Lotus Development Corp.'s 1-2-3 and SAS Institute, Inc.'s Graphics system. The software requires a minimum of 128K bytes of internal memory, IBM PC-DOS 2 or above and a standard editor or word processor. The product does not support expanded memory standards such as the Lotus/Intel/Microsoft Expanded Memory Specification, Layton said.

Spectrum human resource software available for local-area networks

By Rosemary Hamilton

DENVER — Spectrum Human Resource Systems Corp. has announced a version of its human resource and personnel management software that runs in a local-area network environment.

The Spectrum HR/2000 Network, which carries a base price tag of $12,750, is designed for the IBM Personal Computer, Personal Computer XT, AT and compatibles. The package is compatible with the Novell, Inc. Network Operating System, the IBM PC Network, IBM's Token-Ring network the Nestar Systems, Inc. Plan 3000/4000 and Banyan Systems, Inc. networks.

According to Spectrum President James Spoor, the software helps maintain and update personnel records and human resource data. It can be used for budgeting and planning.

The base price covers systems with up to four users. The software costs $14,975 for between five and 10 users. Pricing is on a "somewhat individual basis and depends on the system configuration" for more than 10 users, Spoor said. The product was designed for a maximum of 32 users, he added.

Running under Microsoft Corp.'s MS-DOS 3.1, the product requires a minimum of 512K bytes of internal memory for workstations and a 10M-byte hard disk for the net server.

Spectrum HR/2000 Network is available now. The company's original single-user package, Spectrum HR/2000, was introduced a year ago and costs $5,975.

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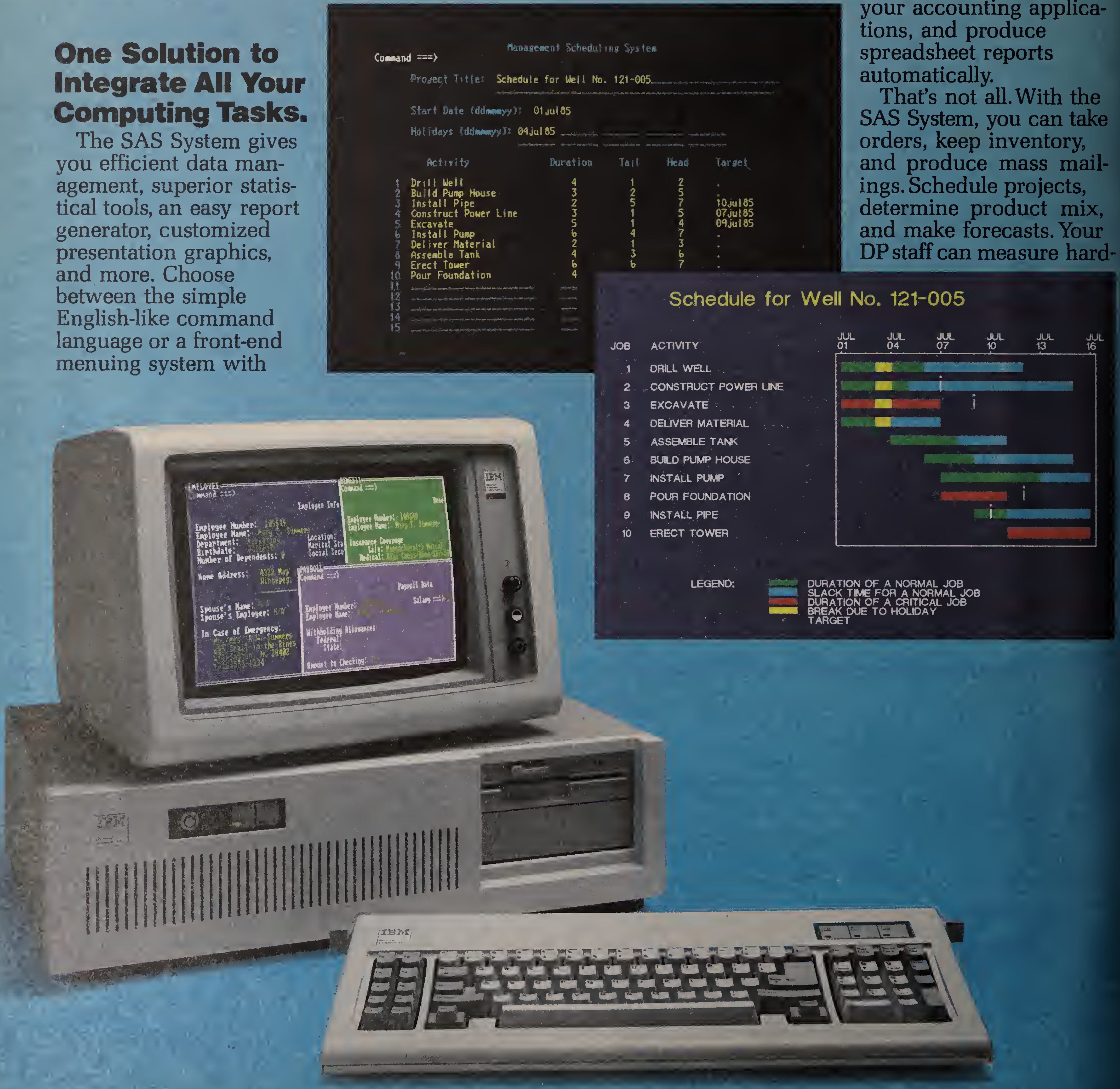

```
                         Management Scheduling System
Command ===>

      Project Title:  Schedule for Well No. 121-005

      Start Date (ddmmmyy):  01jul85

      Holidays (ddmmmyy): 04jul85

         Activity               Duration    Tail    Head    Target

   1  Drill Well                   4          1       2       .
   2  Build Pump House             3          2       5       .
   3  Install Pipe                 2          5       7     10jul85
   4  Construct Power Line         3          1       5     07jul85
   5  Excavate                     5          1       4     09jul85
   6  Install Pump                 6          4       7       .
   7  Deliver Material             2          1       3       .
   8  Assemble Tank                4          3       6       .
   9  Erect Tower                  6          6       7       .
  10  Pour Foundation              4
  11
  12
  13
  14
  15
```

Schedule for Well No. 121-005

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for Your Information Center.

ware resources or system usage, test data bases, and run production programs.

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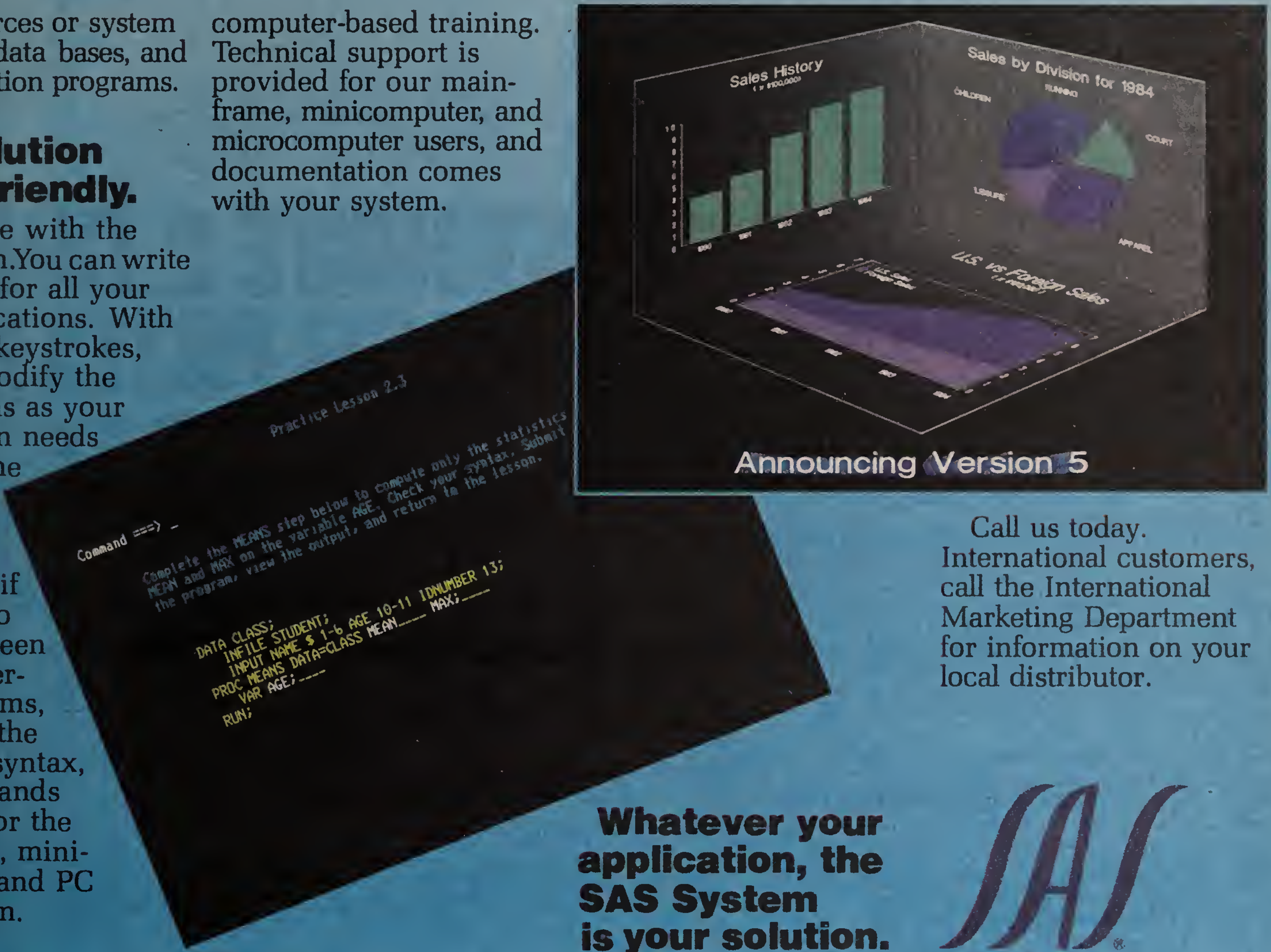


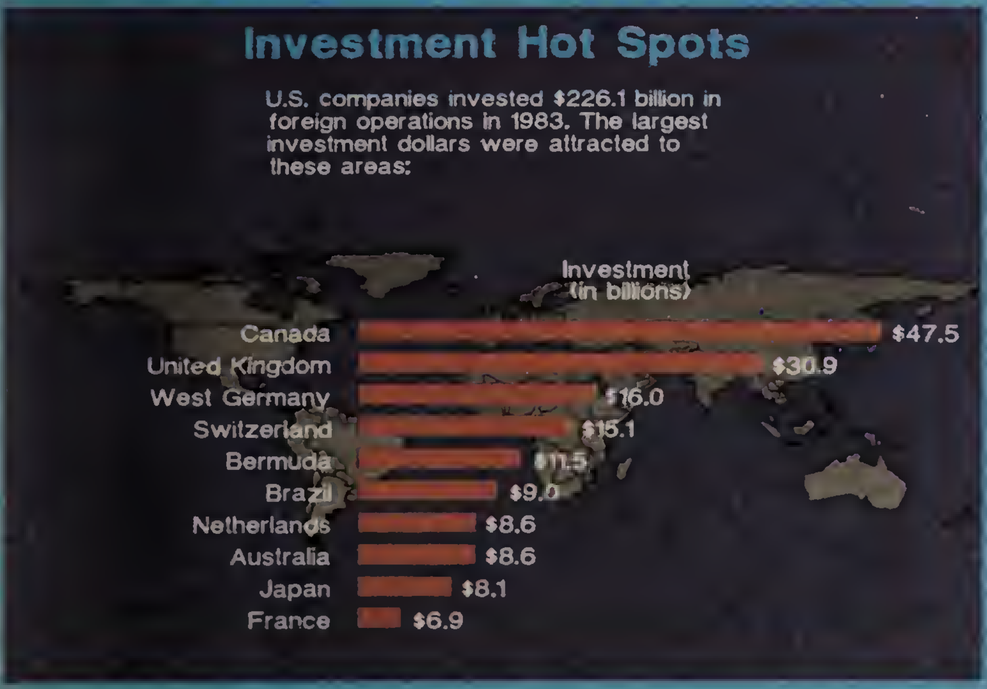
Announcing Version 5

```
Practice Lesson 2.3

Command ===> _

Complete the MEANS step below to compute only the statistics
MEAN and MAX on the variable AGE. Check your syntax. Submit
the program, view the output, and return to the lesson.

DATA CLASS;
  INFILE STUDENT;
  INPUT NAME $ 1-6 AGE 10-11 IDNUMBER 13;
PROC MEANS DATA=CLASS MEAN____ MAX;____
  VAR AGE;____
RUN;
```



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Tecmar rolls out expanded add-on memory, input device

Board said to surpass 640K-byte RAM mark

By Eddy Goldberg

SOLON, Ohio — Tecmar, Inc. has introduced the 640 Plus add-on memory board and Escan, a low-cost combination optical character recognition (OCR) and graphics input device. Both products were designed for the IBM Personal Computer, Personal Computer XT, AT and compatibles.

The 640 Plus board allows users to create spreadsheets, data bases and files requiring more than 640K bytes of random-access memory (RAM). Implementing the Lotus/Intel/Microsoft Expanded Memory Specification bank switching technique, it accesses memory not normally available under IBM's PC-DOS. "IBM erected an artificial barrier at 640K, and these major vendors got together to pass it," commented Jim Smith, business manager at Tecmar.

According to Smith, the most recent versions of Lotus Development Corp.'s 1-2-3 and Symphony are among the few programs that can currently use the expanded memory capabilities. As the 640 Plus and competing boards hit the market, more programs will appear that can use the increased memory, he predicted.

Each 640 Plus board adds from 256K bytes to 2M bytes of memory and can be upgraded by adding RAM chips. Up to four boards can be installed for a maximum of 8M bytes of memory. Retail prices are $475 for 256K bytes, $595 for 512K bytes, $995 for 1M byte and $1,395 for 2M bytes of memory.

Tecmar also introduced Escan, which enables users of hard disk drive computers to convert typed text or graphics into computer files.

"With Escan you get both text and graphics capabilities for $2,495," a spokeswoman claimed. "Most products in this price range have one or the other capability, not both."

She added that Escan works with most word processing programs and can merge graphics into text. It allows users to input all types of graphics, from simple line drawings to complex artwork, and works with both black-and-white and color monitors.

"It also has data compression capability for reduced storage requirements. You can resize an image, stretch it lengthwise or horizontally to fit better on a page." If you scan a graphic image, you can access it with Media Cybernetics, Inc.'s Dr. Halo or Zsoft Corp.'s PC Paintbrush, "enabling you to go into the image and edit it," the spokeswoman said.

Escan's OCR portion, which converts text to ASCII files, recognizes six IBM Selectric type ball fonts. Its software allows users to reset page margins, graphics resolution and other scanning functions. Escan works with a variety of printers and matches the resolution to the printer being used. It is compatible with the Tecmar Graphics Master, IBM Color/Graphics Monitor Adapter and Micro Display Systems Genius VHR Monitor.

Forte Twinax out for IBM systems

SAN JOSE, Calif. — Forte Communications has introduced Forte Twinax, which enables members of the IBM Personal Computer family and compatibles to communicate directly with an IBM System/34, 36 or 38.

The company also announced a price drop on its Fortegraph micro-to-mainframe graphics product line and introduced another version that will run on the AT&T Personal Computer 6300.

The Twinax product allows an IBM Personal Computer, Personal Computer XT or AT to emulate an IBM 5251 Model 2, 5291 or 5292 Model 1 terminal or to connect remotely to an IBM 5294 workstation controller or 5251 Model 12.

"This is the gateway product to the token ring," said George Moore, Forte marketing director. He said Forte will follow IBM's communications path and plans next to support graphics and transfer capabilities between the mainframe and System/36 families.

Forte Twinax, which will cost $895 and will be available in February, permits up to four concurrent host sessions, including a 5250 printer, to operate in background mode. Users can switch between emulation and IBM PC-DOS activity.

Prices for the Fortegraph product line, announced in the fall, were reduced as much as 35%. Fortegraph S2G, including a Forte PJ communications board, now lists for $1,995, down from $2,590. The cost for an upgrade to an existing board is $995, reduced from $1,595. Fortegraph for Digital Communications Associates, Inc.'s Irma communications board is also priced at $995.

Fortegraph for the AT&T Personal Computer 6300 costs $1,995 with a Forte PJ board. It is also available for $995 as an upgrade to an existing PJ board.

YOU DON'T HAVE A COBOL PROGRAM SO PATCHED AND TANGLED IT CAN'T BE STRUCTURED AUTOMATICALLY.

Until recently, there were only two ways to deal with the patched-up, hand-me-down, unstructured COBOL programs that consume up to 70 percent of your company's software effort.

You could continue to live with the old programs, patching and mending as best you could. Or you could scrap the programs, at enormous cost and disruption, in favor of an entirely new system.

But now there is a third alternative. COBOL structuring. The advantages of this alternative are enormous. Among them, the ability to reduce maintenance costs by 50 percent by more effectively using your programming resources.

The technological leader in COBOL structuring is Language Technology, Inc. In fact, of the very few companies who claim to have a COBOL structuring solution at all, Language Technology is the only one with a system, called RECODER,™ that is fully automatic. The others automate only a portion of the structuring task, leaving the really tough parts to be done manually, over a period of weeks or more, by trained experts, who, because they are human, will make mistakes.

BENEFITS OF STRUCTURING

Source: T. Capers Jones

	Unstructured	Completely Structured
Original program size (lines)	50,000	50,000
New code added (lines)	3,000	3,000
Programmer time (months)	12.5	6.5
Total cost	$75,000	$39,000
Defects at delivery	38	4
Stabilization period (weeks)	21	2
Meantime to failure (hours)	1.5	28

The benefits of structuring are illustrated in this example, representing the costs of adding 3000 lines of new code to an unstructured program of 50,000 lines, as compared to adding the same number of lines to the same size structured program.

Based on proprietary language processing techniques and pioneering research in graph theory, RECODER has reduced the tremendously complex mathematics involved to a provably correct solution so complete that it does not force you to accept its own style of structured code. You can select the level of nesting, type of operators, complexity of expressions, formatting style, representation of procedures, and many other features that might be required by your own in-house standards.

RECODER, available as a service or by license, can automatically structure thousands of lines of COBOL in minutes, without the necessity of adding

Users applaud Base SAS tool

From page 19

users noted that they must wait until the more advanced modules like SAS/Stat are released to perform more complex tasks. These products are scheduled for delivery throughout 1986.

"The PC will be limited in the amount of data that it can reasonably attack," Glaxo's Moazed said. But at this point, Moazed and other users are not sure what those limits are. "In terms of large processing jobs, we'll still use the host. The job now is to determine which job fits where," he said.

Donald Cody, manager of biostatistics and research computing at the Department of Environmental and Community Medicine at Rutgers Medical School in Piscataway, N.J., said that he would rather wait until he gets the advanced statistical package, SAS/Stat, before deciding just how much can be done on a micro.

To date, Cody has been working with small data sets, "about 1,000 observations with 100 different variables running," and there have been no problems. "But it's clearly nice to know that the mainframe's back there somewhere," he said.

Users expressed general satisfaction with the software's performance. Every user interviewed said the major benefit of Base SAS is the interactive application development environment the micro version creates with its full screen editing and windowing facilities. "It's not really different from when I used it on the mainframe, except you can see your errors right there," according to Serono Laboratories' Liu.

"My experience has been in batch," said Gary Drucker, data manager at EA Engineering, Science and Technology, Inc. of Middleton, N.Y. "On the PC, it's interactive, and that's a big advantage. It's much easier to develop programs. The windowing is also a big plus."

At Glaxo, the idea behind purchasing the software was to "put SAS in the hands of statisticians," according to Moazed. "Users can download sets of records; that way they won't tie up the host," he said.

Two users who are relying on time-sharing services predicted that the software will cut costs significantly. Liu at Serono Laboratories said he is writing and editing applications on an IBM Personal Computer AT and then uploading files to the mainframe. "Any minute on the mainframe means money spent," he commented. "I want to make sure it'll run without bugs before it goes on the mainframe."

In general, users said, they did not evaluate competitive products, such as the personal computer statistical analysis software from SPSS, Inc.

"The one driving force behind the purchase is that it is a product we know how to support," said Rogers Johnson, systems consultant at the Philadelphia-based Sun Refining and Marketing Co. Liu noted that "I always had been using SAS, so naturally I wanted to go for it."

Users also gave SAS a high rating for its technical support and its documentation. Even though they said they had few problems — it took a few hours to a few days on average to feel comfortable with the software — SAS Institute responded promptly if a question came up. "SAS is just a phone call away," Moazed said.

Although the documentation is considered helpful by these users, they noted that they are familiar with the SAS world. Newcomers, they suggested, would find some problems with it because it is more of a reference manual than an instructional tool. "It's well written and well organized, but I already know where to look," Liu said.

The only significant complaint came from two users running the software on systems with 512K bytes of internal memory. "I was getting inconsistent error messages at 512K," said Cody at Rutgers Medical School. "I upped it to 640K and have had no problems since." Similarly, Drucker at EA Engineering said he would recommend running it at 640K. "I purchased an upgrade to 640K," he said. "At 512K, the software just wasn't happy."

A SAS spokeswoman said she had not heard any similar complaints. "Performance will be better at 640K, but we do say that 512K is what's needed," she said.

Windows tool kit upgrade shipped

BELLEVUE, Wash. — Microsoft Corp. has introduced an updated version of its Windows Software Development Kit, available immediately for $500.

Combined with a programming language compiler, the tool kit contains everything software developers need to build Windows applications, according to Microsoft.

Microsoft's C Compiler, Pascal Compiler and Macro Assembler are among the languages supporting Windows.

Features for the kit include an enhanced programming guide, which describes several sample Windows applications and serves as a tutorial; an expanded programmer's reference; a programmer's utility guide, which documents each utility program included with the kit; and a quick reference document, according to Microsoft.

The upgraded version also will give developers increased access to Windows' user interface and graphics capabilities, Microsoft said.

consultants or any new people to your staff or of requiring any new skills of the people already on it. And, RECODER can do it with a cost effectiveness that will allow it to pay for itself within a year.

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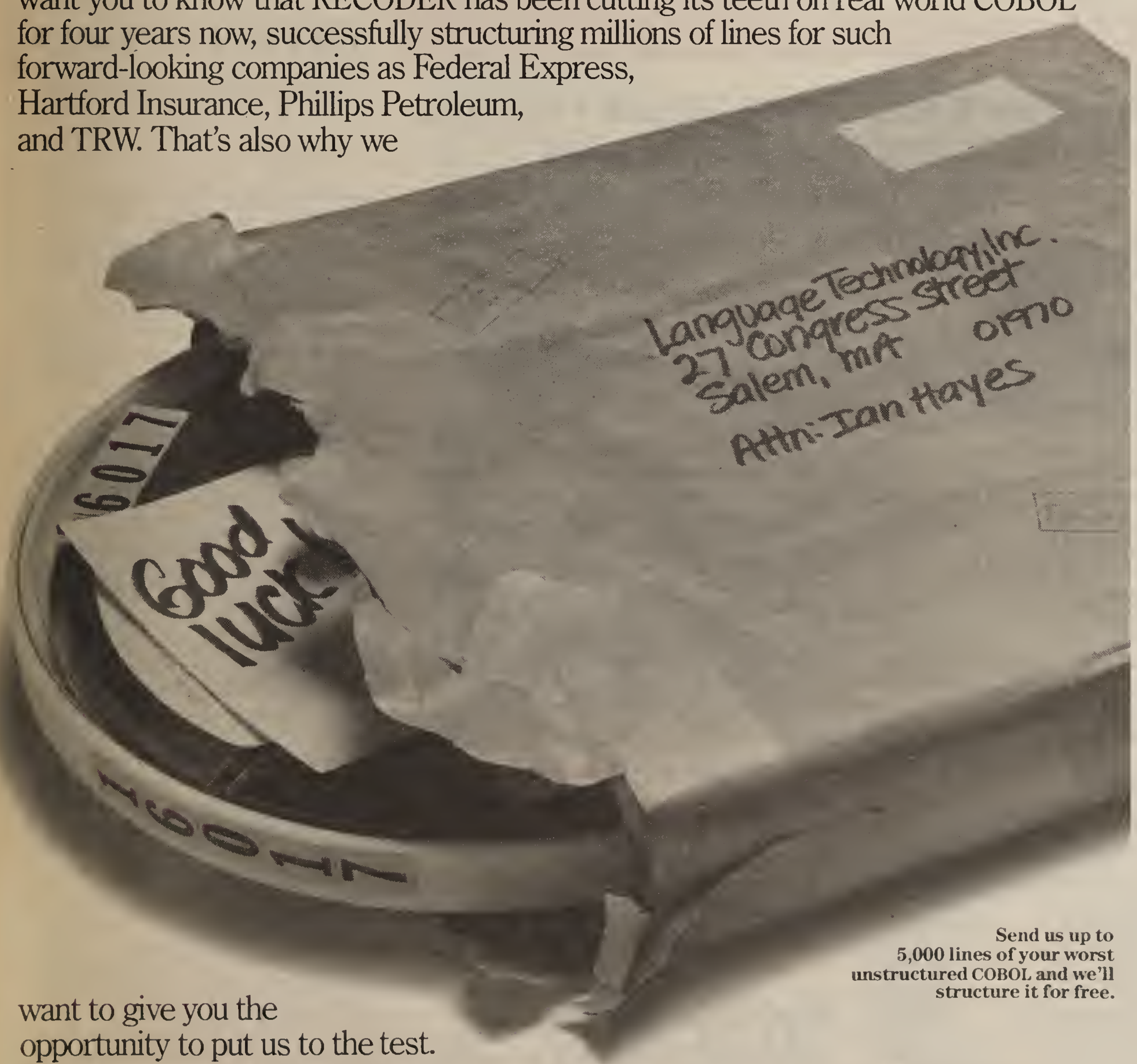

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LANGUAGE TECHNOLOGY

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Tiara adorns network with MS-DOS, IBM compatibility

Former hard-disk maker starts anew

By Peggy Watt

MOUNTAIN VIEW, Calif. — Out of the ashes of hard-disk manufacturer Davong Systems, Inc., which was finally dissolved in July 1985, a revamped local-area network system is rising under the banner of 5-month-old Tiara Computer Systems, Inc.

Tiara personnel, which include Davong founder Thomas Hong and a handful of former employees, enhanced the former Davong Multilink local-area network to run under Microsoft Corp. MS-DOS 3 and work on the IBM Personal Computer AT and compatibles. They renamed it Tiaralink, cut its price 15% to 25% (depending on configuration) and set out to track down what the company estimates are nearly 2,000 users of the late Davong system, according to John Quinn, vice-president of sales and marketing.

Tiaralink can connect as many as 255 IBM or compatible personal computers, allowing them to share data, applications programs and resources with as much as 20,000 ft between nodes. Data is passed at 2.5M bit/sec. along coaxial cable.

The Tiaralink system provides three levels of security and allows expansion without shutting down the entire network.

Optional electronic mail software is also available as well as a link to IBM 3274 Systems Network Architecture systems.

Tiaralink is a token-passing local-area network, based on Datapoint Corp.'s Arcnet, a system also adopted by Wang Laboratories, Inc., Tandy Corp. and Novell, Inc. Quinn calls IBM's choice of a token-ring network "the greatest thing that could've happened" because it validates Davong/Tiara's choice of local-area network architecture.

"We rewrote our business plan" after being greeted enthusiastically by Multilink's existing customer base, Hong said. "Tiaralink will be our major product."

Tiaralink Network Cards, which plug into each MS-DOS machine in the network, have a retail price of $495. A passive four-connector hub, which connects up to four workstations, costs $75; an active eight-connector hub is priced at $595. Tiaralink software for MS-DOS systems is $500, with upgrades to the latest version available to existing customers for $200.

Additionally, Tiara introduced a new, simplified version of Tiaralink, designed for retail channel sales. Tiaralink/R uses menus and a shell for a simpler user interface, so the nontechnical user can install the network.

Personal computer enhancements, graphics and communications programs are also in the offing from Tiara, Hong said. A monochrome graphics board, compatible with Hercules Computer Technology Co. boards and retailing for $299, shipped recently.

DBMS software: Not natural yet

From page 19

touch the data," but requests are clumsy and take a long time.

"A lot of AI software just translates English into code," Rabins added. "Ultimately that's nice but doesn't add much value. The value would come from natural language with some form of expertise, some form of understanding of what the user wants."

Rabins sees some encouraging signs of movement toward this goal in Lotus Development Corp.'s Human Access Language (HAL) technology, originally created as a front end for 1-2-3. "I think they've made a real step forward," he said. "Products like HAL are the harbingers of what's exciting in AI."

HAL software works well partly because it operates in a domain that is more restricted than that of a high-end DBMS, as Lotus principal technologist Jerry Kaplan pointed out.

Another promising natural language approach, which guides users along a phrase-by-phrase route for requests, is offered by Brodie Associates and other firms. These provide tool kits to create interfaces in which illegal or ambiguous queries are not allowed. Users pick their way through a series of menus that show what choices are valid at each step.

Among existing natural language micro products, Microrim, Inc.'s Clout has the highest profile. But while the software attracted a great deal of interest after its debut in April 1984, many observers suggested that Clout never fulfilled its promise.

"Clout had some real bugs," Cubbage said. "If it had actually worked, it might have changed the rules of the game."

Microrim Chairman Wayne Erickson, however, quietly defended the software and said that Clout continues to sell to between 20% and 25% of Microrim Rbase buyers.

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SOFTALK
John Gallant
CW Senior Editor

Relational still worth debating

Some people contend that the ongoing argument over the nature and capabilities of relational data base management systems is as productive as that venerable debate concerning the number of angels that can dance on the head of a pin.

Certainly, as recent *Computerworld* articles penned by E. F. Codd suggest, relational DBMS is still a hot subject. In the nearly 16 years since Codd first outlined the concept of relational data base management, the computer community seems to have come no nearer to a consensus on just how closely a DBMS must conform to the conceptual model to qualify as a true relational system.

But as the war of words — waged for the hearts and souls of users — over relational systems flames anew, some people are saying, "Enough." Whether a DBMS conforms to all of Codd's 12 basic rules, or six of them or none, these obsevers say, is inconsequential. What is important is whether the DBMS meets current needs — primarily simple end-user access to data and more rapid applications development — and is flexible enough to accommodate other requirements in the future. Practicality takes precedence over architecture, they say.

That's a viewpoint that some relational DBMS vendors (Is there such a thing as a nonrelational DBMS vendor these days?) have embraced of late. These vendors, some of which are leading companies in the field, say that real-world implementations of relational technology must stray from Codd's model if they are to serve as effective, efficient solutions. The relational model, it is said, cannot be wholly imple-

See **RELATIONAL** page 26

Future software strategies

Improved SQL-based software, value pricing forseen

In H. Michael Braude's view, software-related decisions are the most important ones users will make for the rest of the 1980s. Successful users, Braude said, will be those who make the right software choices. As director of Gartner Group, Inc.'s Software Management Strategies Service, Braude is eminently qualified to comment on the future of software technology. Instituted in June 1985, the service tracks developments in the IBM mainframe software market and analyzes the strategic issues surrounding operating systems, data base management technology and communications for its current base of 160 clients.

Braude recently spoke to *Computerworld* Senior Editor John Gallant on many of those issues.

INTERVIEW

The Gartner Group's H. Michael Braude

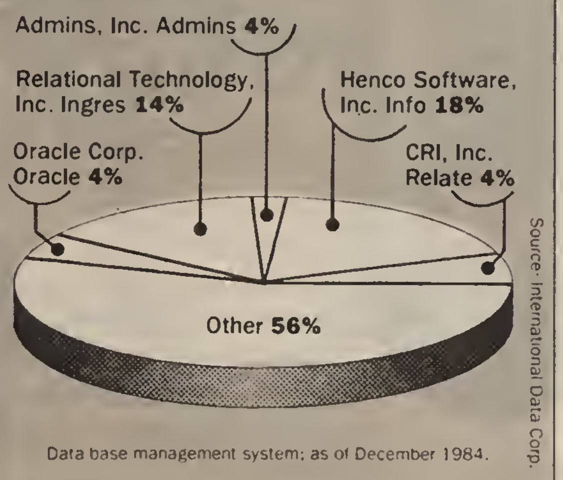
What are the major software issues users will face in the second half of the decade?

The first is choosing the right applications-enabling vehicles. There are many technologies for building applications, none of which is a universal solution. The technologies are building blocks. The second issue is the cost of software. Vendors, particularly IBM, are moving to value pricing. As they add function and value, they are raising the price of software. A survey of users indicates that software budgets are going up by about 32% a year. Some people will experience larger increases than that.

See **STRATEGIES** page 31

DATA VIEW

Independent DBMS software running on supermini systems



Data base management system; as of December 1984.

Henco and Relational Technology lead the independent DBMS market.

Pathway forges enhanced link

By John Gallant

NATICK, Mass. — Pathway Design, Inc. last week enhanced its microcomputer-to-mainframe link and local-area network gateway products to provide support for two-way, binary and text file transfer between micros and mainframes.

Pathway Design's FTpath works in conjunction with the company's PCpath SNA 3270 and PCpath BSC 3270 link packages and its Netpath SNA 3270 gateway product.

The file transfer program supports file transfer to and from an IBM mainframe running IBM's 3270 PC File Transfer software under IBM MVS/TSO, CICS or VM/CMS across an IBM Systems Network Architecture (SNA) or Binary Synchronous Communications (BSC) network. Binary or text files can be exchanged through Send or Receive commands.

See **PATHWAY** page 26

INSIDE

Ultimate offers an implementation of its Ultimate operating system for DEC VAX processors/**31**

NEW THIS WEEK

- Software Assistance announces SA/Sort
- For more on this and other new products, see pp. 83-109.

INSTANT ANALYSIS

"Users aren't interested in the rules of relational to the extent E. F. Codd is. But they are beginning to understand the rigor behind Codd's approach. We think it is healthy to bring these issues up, but at the same time we are not apologetic for what we as a company have done."

— Antony Percy of Applied Data Research, Inc. on relational data base management systems

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Oracle announces portable version of IBM SQL/DS and DB2

Any application written for IBM's SQL/DS or DB2 relational database management systems will now run without modification on DEC, DG, AT&T, HP and several other manufacturers' minis, and a wide range of micros, including the IBM PC/XT and PC/AT.

Oracle Corporation introduced the first relational DBMS in 1979. Today ORACLE is the only relational database management system that is completely compatible with IBM's SQL/DS and DB2. Programs written for SQL/DS or DB2 will run unmodified on ORACLE.

Originally designed for IBM mainframes and DEC superminis, ORACLE is now available on a wide range of machines, from mainframes to PCs. And ORACLE includes an integrated set of 4th generation software tools not available with either SQL/DS or DB2.

■ **Why not Cullinet, ADR or Focus?** There is a clearly defined standard for relational database systems. It's called SQL, and it's from IBM. Both ANSI and the US Government are in the process of adopting SQL as *the* standard database language. The Cullinet, ADR and FOCUS software packages each implement their own unique database language - each one painting the user into its own corner. Since its inception, Oracle Corporation has provided total IBM SQL compatibility.

Few shops nowadays run only IBM mainframes. Why, then, even consider a database solution that runs *only on IBM mainframes?* Applications written with ORACLE run identically on mainframes, minis, and PCs. Because all versions of ORACLE *are* identical.

FOCUS, Cullinet and ADR offer either a limited subset, a completely different product or nothing at all (respectively) for the PC. And none have minicomputer products.

■ **Why not just go with DB2 or SQL/DS?** A relational DBMS simplifies but does not by itself eliminate application programming. Additional tools are necessary if users are to create and maintain their own applications.

DB2 and SQL/DS are relational systems, period. ORACLE is a relational DBMS plus integrated 4th generation software tools for application generation, report writing, color graphics and network communications.

Furthermore, SQL/DS and DB2 run only on IBM mainframes (and are somewhat unlikely ever to run on another vendor's system). ORACLE runs on more IBM hardware and operating systems than do IBM's relational products.

■ **What about Goldengate, dBase III, Symphony or Framework?** PCs need more than PC software if they are to be usefully integrated with corporate data processing. Incompatibility with SQL, while serious, is not the only major problem with these micro packages. None provides an acceptable level of data security, integrity or recovery facilities. And their PC-to-mainframe links are functionally primitive and difficult to use.

To effectively link computers, all machines in the network should run the same software. Only ORACLE provides standard software on mainframes, minis and micros. Data and programs can then be shared among users of different machines, distributing the workload.

ORACLE is currently installed on over 1000 mainframe and supermini systems around the world, as well as on thousands of PCs. Oracle's customers include 8 out of the 10 largest U.S. corporations, as well as major foreign companies and government agencies.

For further information, contact Oracle Corp., Dept. C2, 2710 Sand Hill Rd., Menlo Park, CA 94025, or call 800-345-DBMS

Relational worth debate

From page 25

mented in a mainstream product today. Vendors claim that it is wrong for Codd to chide practitioners for failing to live up to the admittedly high standards he has set.

While there may be users, analysts and vendors who are quite willing to dismiss the debate over relational purity as a fruitless endeavor, there are others who quite vehemently disagree. This group, led by Codd, argues that many of the very vital benefits promised by relational systems may be lost if the model for relational technology is not followed carefully. It is not enough to support some relational capabilities atop a hierarchical or networked system, proponents of purity claim; the underlying architecture of a DBMS must follow Codd's rules.

This group contends that vendors have not strayed from the model but have ignored it. As evidence, they point to the fact that two of the leading DBMS marketed as relational fail to adhere to even a couple of Codd's rules. As Codd told *Computerworld*, "It is ridiculous for vendors to talk about serving the practical needs of users and not theoretical needs. Some practical needs can only be served through a decent theoretical foundation."

Where does the truth lie in the relational debate? (Or, perhaps more fundamentally, is relational worth debating?) As with most controversies, the truth lies somewhere in the middle.

Users and Codd are absolutely correct in insisting that a vendor explain how a product billed as relational conforms to the relational model. It is muddling the issue to claim that the model is constantly in flux or has only recently been divulged fully. The basic pieces of the relational architecture have been in place for some time now.

There is currently nothing on the horizon in terms of data management technology that promises to eclipse the relational approach. So users are quite justified in insisting that vendors work toward full adherence to the model, and they are quite justified in asking how a product that fails to conform to the model at all will conform any better in the future.

But there is something to be said for the practical point of view also. Vendors must provide workable solutions that provide them with a profit. Users appear to be asking only that a vendor work toward fulfilling the rules of relational.

There is one group that is in the wrong — those who would dismiss the relational debate altogether. Sans acrimony, the relational debate can only serve to shed light on an issue too important to be sidestepped.

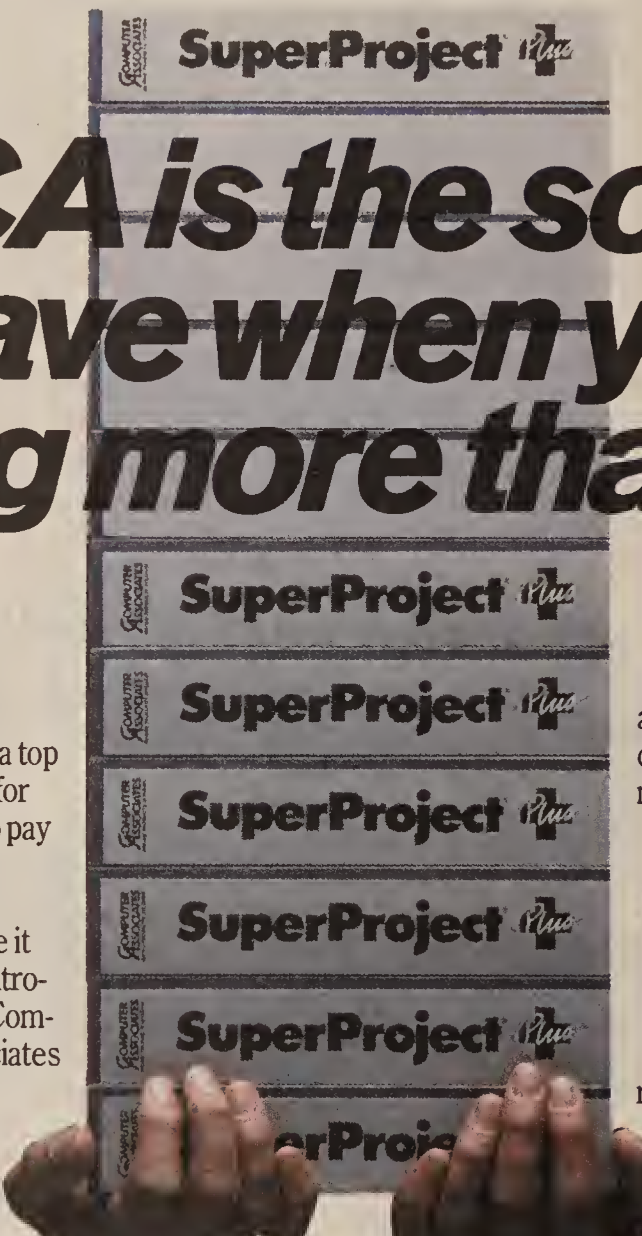
Pathway forges link

From page 25

The product also handles EBCDIC-to-ASCII file conversion, but the target application must handle further reformatting.

A spokesman for the company said FTpath must be installed on all micros in a local-area network, which can communicate to a mainframe through the Netpath SNA 3270 gateway installed on one workstation. The gateway package supports a variety of local-area nets. The FTpath package also provides customization menus that allow users to tailor the product with warning messages and other functions. A spokesman said FTpath was developed in conjunction with Digital Communications Associates, Inc.

The FTpath system is bundled with PCpath and Netpath. PCpath with FTpath is $890. Netpath with FTpath costs between $1,995 and $3,995.



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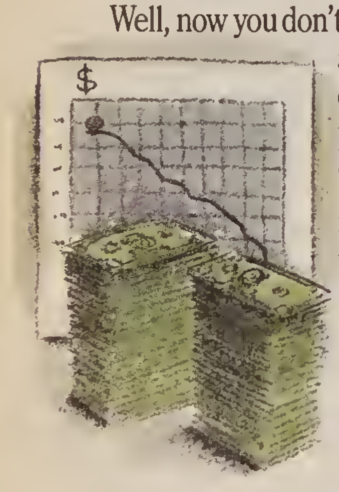

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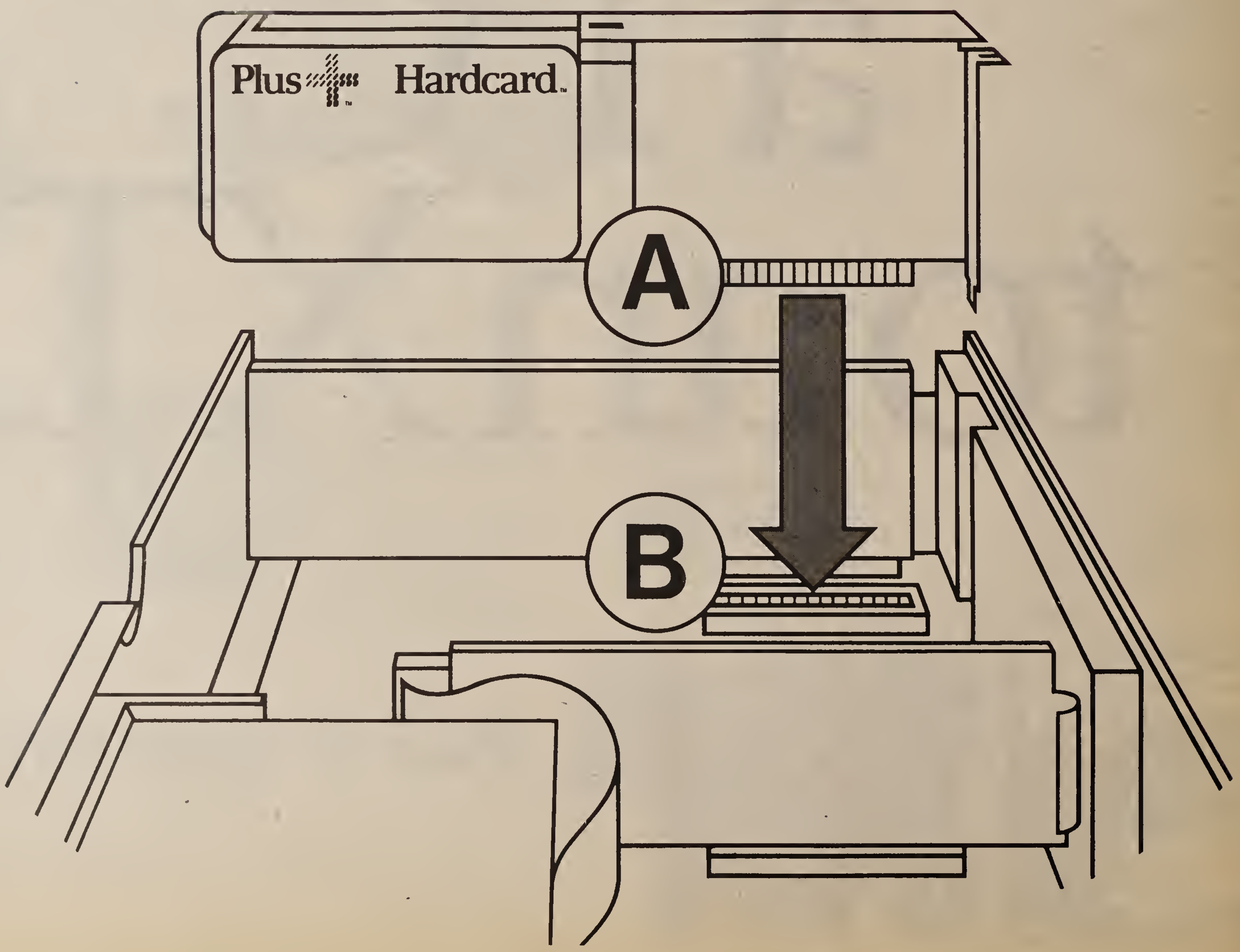

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SOFTWARE & SERVICES

Ultimate makes operating system available for VAX processors

By Eddy Goldberg

EAST HANOVER, N.J. — A co-resident implementation of Ultimate Corp.'s Ultimate operating system has been announced for Digital Equipment Corp.'s VAX processors.

The Ultimate Series 8000 is a hardware and software product that provides VAX users with access to more than 1,000 business application software programs currently running under the Ultimate operating system. For Ultimate users, the VAX VMS operating system and programs designed to run in that environment are now a viable option.

According to Larry Matte, director of product marketing, Ultimate installs its own operating system and memory boards on a VAX. "Our implementation is a micro-programmed architecture with instructions hard coded into it," he explained. Ultimate Series 8000 permits a mix of terminals to run either environment and allows files to be moved between environments. The operating system is packaged with fourth-generation language capabilities, word processing, graphics software and utilities.

The Series 8000 will be available in April. Prices vary with the implementation and range from $30,000 to $55,000.

Strategies for software

From page 25

Why is the debate over the capabilities of relational systems still continuing? Are users condemned for the time being to rely on two data base management systems for two different sets of needs?

Users have already decided to bring in multiple DBMS. The average IBM MVS machine has two DBMS installed on it already. We don't see that changing. All the solutions are building blocks; people are bringing in different solutions to solve different problems.

The reason the relational debate continues is that it is religious in nature; it's theological. You can never settle anything religious. Is relational better? That is an academic question. Until something hotter comes along, people will jump on relational technology as the wave of the future. The real issue, from the point of view of investment in software, is IBM's SQL. People should look to see if a product uses SQL protocols as the program access to the DBMS. People should be asking, Can the vendor provide me those SQL capabilities? That question is one with a much more clearly understood answer.

Why is SQL important, and what should users be looking for in SQL developments?

SQL is to DBMS what Ethernet was some years ago to local-area networks and what IBM's Netbios is now to local-area networks. It is a standard for a program interface that allows people to make investments in comparative safety. You can be more comfortable and have greater financial safety making an investment in that technology. It gives you a standard programming environment and allows you to insulate your programming asset from transitory technology.

Look for some attempt to extend the definition of SQL to a standard for report generators, query processors and other high-level tools. There are no standards for the high-level software facilities that sit on top of SQL. I would also look for data base machines to receive some prominence. Right now the performance of SQL-based systems is atrocious.

See **STRATEGIES** page 32

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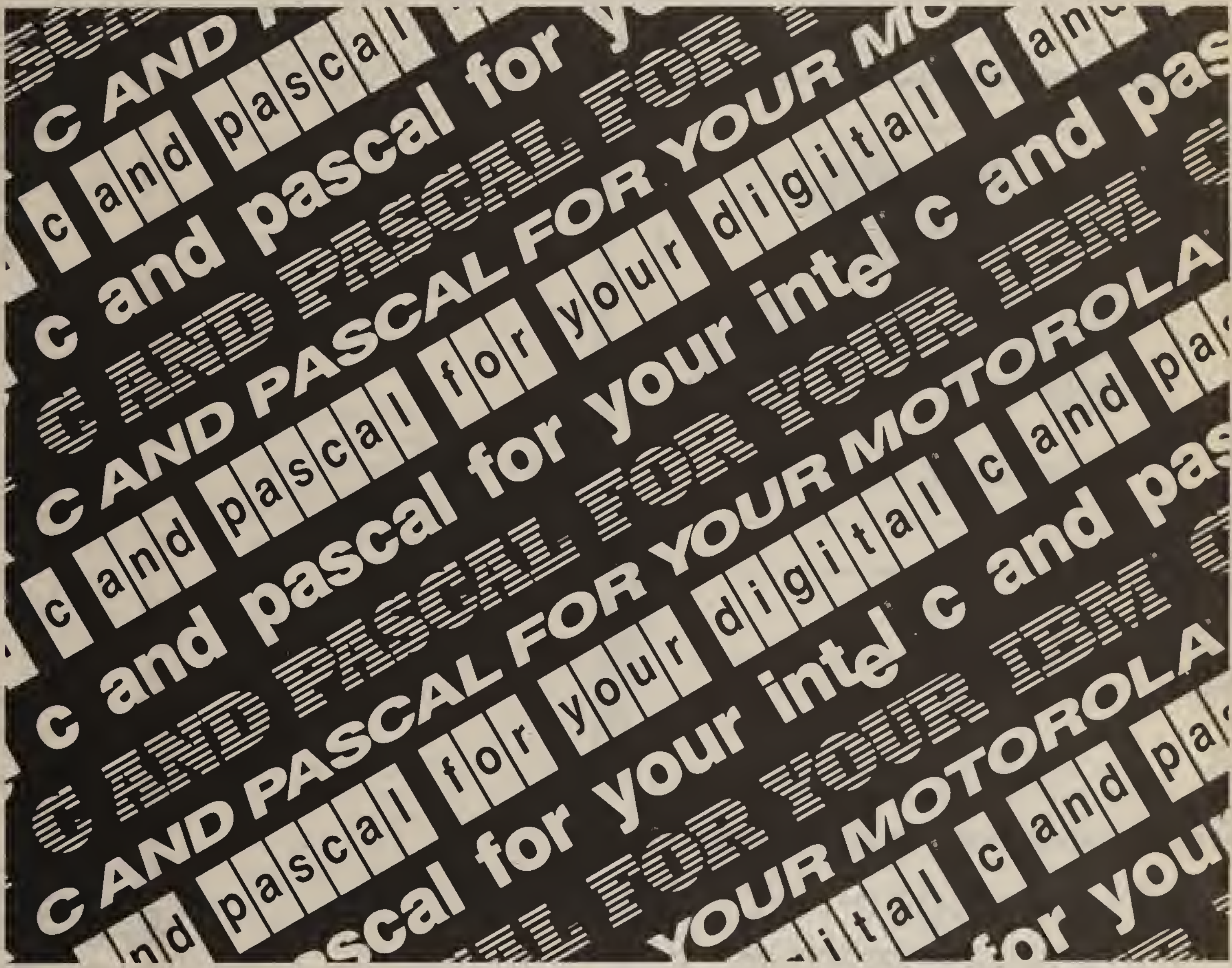
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Strategies for software

From page 31

But data base machines are a high-performance alternative. The performance of SQL-based software will increase sharply. The transaction-handling capability of these systems is somewhere in the 10 to 15 transaction/sec. area now. That should triple or more over the rest of the decade.

Considering that DB2 is a linchpin of IBM's future DBMS strategy, what advances should users expect in DB2 over this time period?

You'll see better implementation and support of things like referential and domain integrity and other things that DB2 doesn't fulfill yet. Over the next few years DB2 will fill in all those relational holes.

Also, DB2 has to advance in performance and productivity. In performance you are looking at transactions per second as well as the physical size of the data base. DB2 isn't everything it should be in those areas. IBM will focus on wrapping those up over the rest of the decade. The transaction-handling capability of DB2 will double or triple over that time frame.

On the productivity end, there is not yet a fourth-generation language to work with DB2, and there is not an active data dictionary. You haven't got as integrated and as productive an environment as you have from some of the independent vendors.

IBM is going to implement a simulated active dictionary, which means that out of the current dictionary product and the Cross Systems Product, IBM will build a set of interfaces that will import and export data definitions, screen formats and things like that automatically. So people will have a perception that it is an integrated environment.

How can users deal with conflicting claims and make the best DBMS choice?

Users have to look at the issues that are important to them. Why are they looking at a DBMS? Once you understand what you are looking for, then look at the vendors, and there are only six or seven key vendors in this area.

Try to understand those vendors from a philosophical and personality point of view. Which issues does each vendor play strongly to? What are the strategic strengths and weaknesses of each? Avoid going down a list of 50 or 60 features, giving them ratings from one to ten.

It seems that fourth-generation languages alone are not the answer to the productivity crisis. What are the types of advances that will have to be made to help users boost productivity?

There are three or four types of fourth-generation languages. Vendors are going to start grafting onto their systems some of the better things from other systems. Instead of being just an isolated building block, the product moves closer to being a total solution.

Also, the tools will be extended to personal computer-based workstations so people can do a lot without mainframe resources and communications costs.

The other thing to look for is Ada technology. With the money that is being spent on Ada technology, you have to believe there will be some trickle down into the commercial environment.

What about the problem on the other end, maintenance? What will be coming in products to help with that?

Code restructuring has a long way to go before it is an effective solution. None of the products on the market handle IBM CICS or IMS programs. They only handle batch programs.

But unless people acquire those technologies now, as imperfect as they are, they may not develop as much as they could.

Some of the structures in Ada for maintaining very complex, modularized code could trickle down to the commercial environment toward the end of the decade.

Do you think that, in terms of evolution, hardware is leaving software behind?

Hardware has been way ahead of software for a long time, and the gap is widening. IBM software is at least two or three years behind totally exploiting its hardware.

The independent vendors are even farther behind. IBM could build an eight- or 16-way processor. But what operating software would support that? Also, there are three or four times as many software failures as hardware failures.

What is the real significance of IBM's LU6.2?

LU6.2 is a communications architecture for cooperative processing among machines at different locations. It is the low-level communications protocol that cooperative processing requires. And software developers now are focusing more on cooperative processing. Users get led down the primrose path in terms of the things that are said about LU6.2. The real focus is that it is a vehicle for cooperative processing.

For the rest of the decade, the work will involve filling in products with these cooperative processing capabilities. That is fairly well understood by vendors, but that understanding does not extend beyond them.

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COMMUNICATIONS

WIRE TAP
Daniel Minoli

ISDN stands at the threshold

SECOND OF TWO PARTS

Good news is on the horizon for the data communications manager. After years of preparation and standardization by the Consultative Committee on International Telephony and Telegraphy, the Integrated Services Digital Network (ISDN) is about to make its debut. ISDN will solve many of the problems faced today in data transmission.

ISDN will provide an end-to-end digital path. This implies that multiple conversions of the data along the path, with ensuing distortions and processor delays, will be avoided. The path will be much cleaner because of the intrinsic robustness of the digital signal in the presence of noise.

Much larger capacity will be available to the end user on a routine basis. At least two 64K bit/sec. channels and another 16K bit/sec. signalization/packet channel will be provided with each basic connection. From the end-user's perspective, this means each 9.6K bit/sec. channel will have at least 12 times more capacity.

This will make ISDN much more practical for file transfers, full screen inquiry/response applications and graphics transmission than today's fa-

See **ISDN** page 36

Minoli is a member of the Bell Communications Research (Bellcore) network architecture planning group. Opinions in this column are strictly the author's and do not represent the view of Bellcore.

Wang Communications gains access to Pacific Bell exchanges

By John Dix

ARLINGTON, Va. — Wang Communications, Inc., the wholly owned specialized common carrier subsidiary of Wang Laboratories, Inc., was recently granted permission by the California Public Utilities Commission to offer services within Pacific Bell's local exchanges, an unprecedented action in that state.

The commission is permitting the regional carrier to offer T1 1.54M bit/sec. and higher speed digital transmission services within the Los Angeles and San Francisco Local Access and Transport Areas (LATA).

While Wang Communications and other carriers operate intra-LATA services in other states, the knife edge the carrier has been able to pry into California is considered important because of the conservative commission there and the size of the market.

The San Francisco network under construction will extend from the American Industrial Center to Concord, Calif., and have a number of jumping-off points along the way, mostly determined by customer demand. The Los Angeles net will extend west from downtown to Culver City, Calif., and south to Torrance, Calif. Custom point-to-point transmission services will be available in both cities.

Wang Communications has interests in

See **WANG** page 35

DOD scouts data network

Arpanet-based net yields low-cost, reliable DDN

SECOND OF TWO PARTS

By William Stallings
Special to CW‡

The military standard protocols discussed in this column last week represent one part of the communications and networking strategy of the Department of Defense.

The other part is the Defense Data Network (DDN). The key objective of DDN is to control communications costs by providing a DOD network that will satisfy most of its long-distance communications needs.

During the late 1960s, the Advanced Research Project Agency (ARPA) made a series of grants to universities for the purpose of establishing an experimental network to interconnect their computer systems.

At the same time, Bolt, Beranek & Newman, Inc. was contracted to develop network processors and to provide overall project management and direction.

Bolt, Beranek & Newman selected the Honeywell, Inc. 516 minicomputer as the hardware for the network processor, which became known as the Interface Message processor, and developed the software and special communications interface hardware required.

The network, which became known as Arpanet, has been in continuous operation since 1970. By 1975, the network had grown to more than 50 nodes and supported a variety of terminals and computer systems. Over time, most network activity was attributed to the DOD rather than uni-

See **DOD** page 36

Stallings is president of Comp/Comm Consulting of Great Falls, Va., and the author of Data and Computer Communications *(Macmillan, 1985). He will conduct a short course on Defense Data Network and Department of Defense protocol standards for the University of Maryland Conferences and Institutes Programs on June 4-6.*

INSIDE

A new generation of data compression products debutted last year, made possible by advances in the technology/**35**

NEW THIS WEEK

- American Home Network's American People/Link accommodates spreadsheet files
- For more on this and other new products, see pp. 83-109.

INSTANT ANALYSIS

"There is more competition going on between AT&T and the divested Bell operating companies than there ever was before, and you're getting deals both ways. It's a good time to be a consumer."

— **William G. DuVall**
vice-president of network operations for Compuserve, Inc.

Codex unveils multiplexer

Mid-range 6740 DCP added to 6700 series

By Paul Korzeniowski

MANSFIELD, Mass. — Codex Corp. has added a mid-range device to its recently announced 6700 series of statistical multiplexers. The Codex 6740 DCP supports asynchronous, synchronous and bit-oriented interfaces from the same ports and provides dynamically allocatable bandwidth, alternate routing and congestion control.

The statistical multiplexer supports up to 64 ports or channels at speeds up to 19.2K bit/sec. System capacity is application dependent. A full complement of 64 ports can be supported when each is asynchronous and operating at speeds of 9.6K bit/sec. or lower, according to Mike Delfiner, manager of multiplexer marketing.

When the 6740 is configured to support half-duplex synchronous channels at speeds up to 19.2K bit/sec., the maximum number of system ports drops to roughly 13. The multiplexer can support six IBM 19.2K bit/sec., full-duplex Synchronous Data Link Control ports, presuming 60% channel utilization.

The 6740 supports up to eight asynchronous, synchronous or bit-oriented transmission links at speeds ranging from 2,400 bit/sec. to 64K bit/sec. and is capable of multiplexing up to 64 channels on one or more high-speed links.

The multiplexer is based on Motorola, Inc.'s 68000 and 6809 microprocessors, a multiprocessor architecture that provides features such as switching, redundancy, end-to-end control and the ability to down-line

See **CODEX** page 36

Connecticut real estate agency feels at home with automated environment

FAIRFIELD, Conn. — In a move to transform business from a back-room operation to an automated environment, a realty firm here built a local-area network that links 22 offices serving an area of 92 localities in Connecticut.

William Raveis, president of William Raveis Real Estate, explained, "Three years ago, I had the choice of either expanding the company or making the existing organization more sophisticated. Rather than dilute the company by entering other markets, I decided to make it more competitive through automation."

Raveis said that when he began searching for a networking system in 1982, he defined four goals:

■ To standardize multiple listing services. The agency serves 92 towns in Connecticut, and each locality has its own way of doing business, Raveis noted. "I wanted to create a standardized data base of all the information on housing in the different localities."

■ To supply agents with access to up-to-date information both in the office and from remote locations, thus enabling them to make better decisions on the spot.

■ To discipline paper flow in the office. Real estate has traditionally been an undisciplined, back-room operation, Ravies explained. "I wanted to automate management reports, client information and communication and forecasting information on closings and transactions."

■ To disperse information through an electronic messaging system.

See **REAL** page 34

Real estate firm automates listings

From page 33

To accomplish these goals, Raveis installed a Datapoint Corp. ARC local-area network. "I had to have a system with telecommunications capability that I could build from and that would be compatible with different types of hardware," he explained.

The hub of the network is at the firm's Fairfield central office, which houses eight Datapoint 8600 desktop units with a total of 130M bytes of disk storage and a high-speed printer. The firm's additional 21 offices — including 19 branch offices, William Raveis Insurance, William Raveis Mortgage Co. and a Relocation Counseling Center — each have at least one Datapoint 8600 with 10M bytes of storage and a high-speed printer. All told, Raveis said, the network supports 40 desktop units.

In addition, Raveis hired Vidcom International, an Old Greenwich, Conn.-based software development firm, to develop applications to fulfill his requirements.

Central data base

The network includes a central data base in the company's Fairfield office that contains all the multiple real estate listings, explained Raveis, who was a system programmer for five years before entering the real estate business. "Through the network, each of our 400 agents can find out what is on the market, and as a result, better serve our customers."

The agents can access the multiple listing information from one of the branch offices or any other remote location. Each agent has a Texas Instruments, Inc. 707, a portable terminal/printer with a built-in modem. "The agent can hook into the data base from any remote location and print out data on a particular listing," Raveis explained.

Agents also use the system to assist homeowners who need to sell their homes before buying another. This application provides an appraisal of the market value of the client's home. "The agent enters the features of a client's home — such as the number of bedrooms and bathrooms," Raveis explained. "The system scans the comparative file and prints a list of what other homeowners received for similar properties.

The system also serves employees in the firm's relocation center and mortgage company, Raveis said. Agents at the firm's relocation center access information stored in the central data base to counsel clients on the features, benefits and drawbacks of specific areas in the state. The system also stores a record of each mortgage application, including available interest rates, employment verification and credit record.

Applications in the office

The system is also used for business applications in the office as well as on the road. According to Raveis, the system performs word processing, financial analysis and accounts receivable and payable applications.

The system automatically prints letters welcoming buyers to their new homes. In addition, Raveis explained, the system provides a cost-effective way to gather market information. "We maintain a controlled list of clients and homeowners, and we send each one a survey designed to find out how we perform. This adds a whole new dimension to our business by enabling us to hit our customers more effectively."

The real estate agency also uses electronic spreadsheets and graphics packages to monitor its advertising budget. "We survey customers after they buy a house from us to find out how they got to us," Raveis said. "We graph this information for every office. What the computer can do in a day or two, we could never do before; we could only guess at this information. It enables us to make better decisions on where our advertising dollars go."

Raveis said he plans to implement Datapoint's Electronic Messaging System to enable his agents to communicate electronically, to eliminate paperwork further, speed communication and cut postage costs. "Every agent will have an electronic mailbox where he can access his messages," Raveis explained. "Right now, it's only a matter of getting the system on board and educating the agents."

Education, Raveis added, was the biggest impediment to the system implementation. "There was a lot of resistance," he explained. "People were used to doing business the old way, and getting them to change was a major undertaking.

"In the past 2½ years, I developed a training program in which every agent is trained individually," he continued. "Some caught on immediately; some lagged behind. It was a slow process, but it is working now."

Raveis said he has invested $1 million in the system so far and claimed that the investment has paid off handsomely. "The system gave us a new dimension — the opportunity to gather business faster and a competitive edge," he said. "I can't estimate an exact return, but our business has grown 40% in the past year, and I'd say half of that growth is a direct result of the network."

Raveis said he is exploring the idea of expanding the system by leasing time on cable television so customers can access the firm's data base at home. "If people can hook into a data base to shop or bank at home, they can also look for real estate at home."

The system has so far fulfilled Raveis' goals. "The system reoriented the agent's job function, making him more effective and competitive. The purpose was not to reduce the work force, but to improve it."

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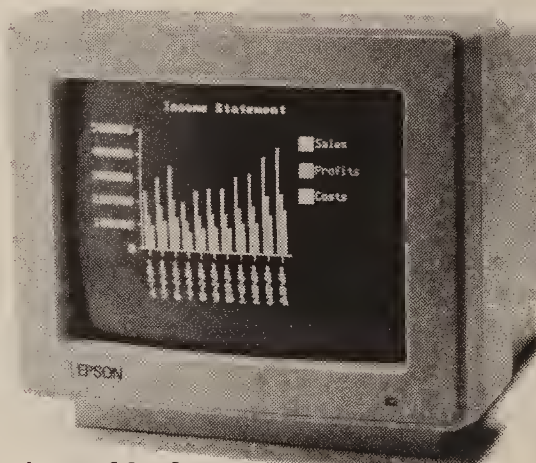

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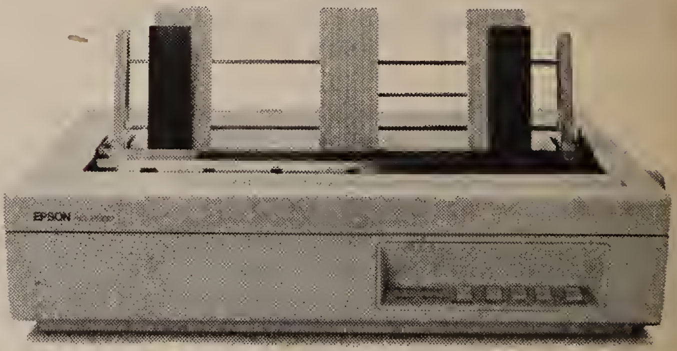

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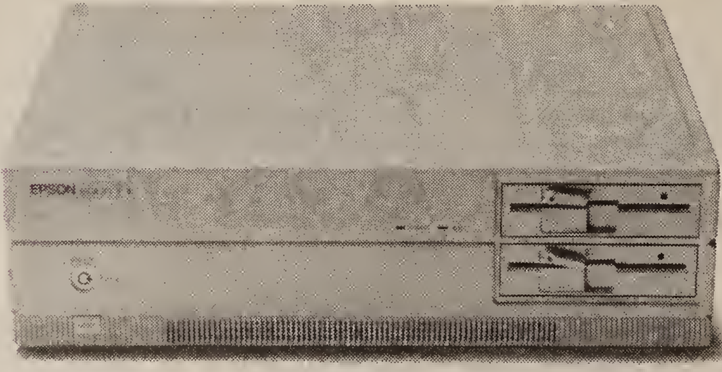

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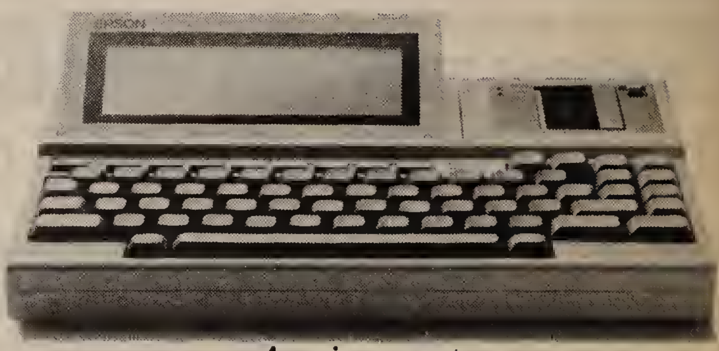

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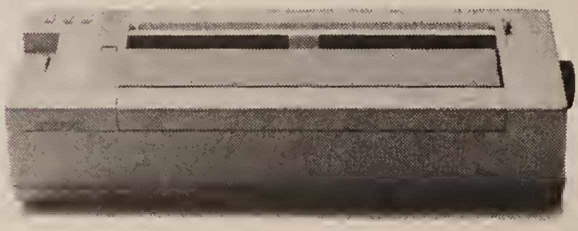

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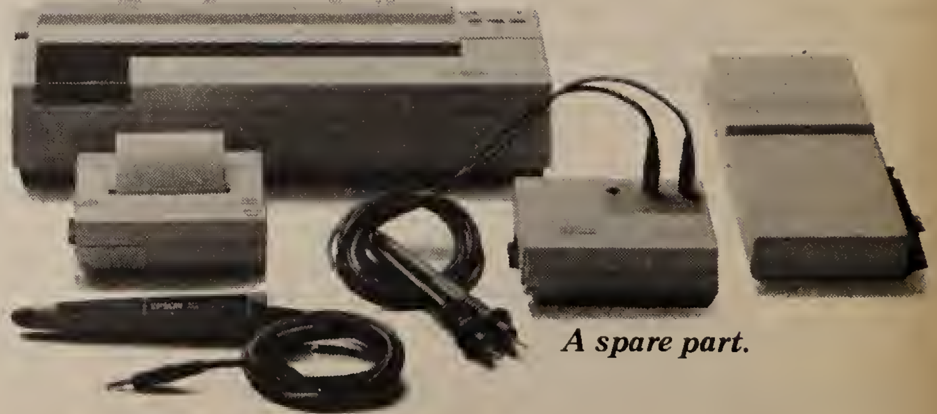

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Wang gets access to Pacific Bell

From page 33

three other areas: Boston, Philadelphia and Chicago. The Boston network runs north to Lowell, Mass., headquarters of Wang, and up into Nashua, N. H. The Philadelphia network, scheduled for completion in April, extends south to Wilmington, Del., and east to Atlantic City, N.J. Chicago's net, which is in final testing, connects with Milwaukee, Wis.

In addition to these major networks, the carrier offers some off-net services or will build point-to-point facilities to order within a 100-mile radius of these city points.

Transmission facilities used differ case by case, and they include terrestrial microwave, fiber-optic cable, laser and coaxial cable technologies.

Network control is provided from a central facilty that remotely tests and monitors the networks nationally.

Although Wang Communications describes itself as an information transmission company, the T1 facilities are ideal for bulk voice services. The Boston network, for example, terminates downtown at the Prudential building, a local landmark.

Coincidentally, the Prudential is also MCI Communications Corp.'s point of presence in Boston. Users along the north to east corridor of Wang Communications' route could potentially tap MCI's network to establish direct access to the discount long-haul carrier, totally bypassing New England Telephone Co.

Data compression devices win marketplace acceptance

By Richard Scott
Special to CW‡

Many technical obstacles that beset data compression techniques for communications were overcome last year, resulting in the creation of a new generation of products.

The ability of these products to double transmission speeds and provide multiplexing and error correction gained them widespread user acceptance in 1985. This ability sharply contrasts with the limited capabilities and low usage of these devices in previous years.

Market conditions and technical breakthroughs led the way for the second generation of data compression devices. The market increasingly saw users shifting toward the use of bit-synchronous protocols, such as IBM's Synchronous Data Link Control (SDLC) and asynchronous data packeting with error correction.

Technical breakthroughs included the development of sophisticated data compression techniques, made possible by users shifting to packet-oriented protocols, the availability of faster 16- and 32-bit microprocessors and the emergence of the 256K-bit memory chips that are needed to support these newer techniques.

The leading data compression devices are divided into three markets: asynchronous dial-up, synchronous dial-up leased line and synchronous line multiplexers.

Asynchronous dial-up users saw the introduction of 2,400 bit/sec. data compression modems that offer throughput of 4.8K bit/sec. and higher rates over voice-grade dial-up phone lines. Datec, Inc. of Chapel Hill, N.C., and Microcom, Inc. of Norwood, Mass., offer units that use Microcom's error correcting protocol to convert asynchronous data into packets for the compression. It is interesting to note that the data compression feature of these units is provided at a very nominal cost addition to the modem base price.

Line multiplexing products

For users of synchronous dial-up and multipoint leased lines, line multiplexing products were announced. IBM 3270 users were introduced to a low-cost unit by Firecom Corp. of Raleigh, N.C., that can double the data rate for dial-up or multipoint leased line terminals.

More significant improvements were made in line multiplexers for asynchronous devices. Firecom; Racal-Vadic, Inc. in Sunnyvale, Calif.; and Symplex Communications Corp. in Ann Arbor, Mich., unveiled line multiplexers that use data compression techniques to compress data to 50% of its original size.

Devices from these vendors can actually transport data from two 9.6K bit/sec. channels over a single 9.6K bit/sec. data link, resulting in significant savings for the user.

These units have made inroads with users who have terminals with dissimilar protocols, such as an IBM Binary Synchronous Communications remote job entry station and an SDLC 3274 remote controller. The multiplexers are used to share the same phone line, with both terminals appearing to run at the modem speed.

Rising phone costs and the availability of reasonably priced data compression devices have finally made data compression a viable technique for reducing communications costs while maintaining performance. This year should see further acceptance of data compression communications devices.

Scott is president of R. Scott Associates, Inc., a consulting firm in Raleigh, N.C., that specializes in designing communications equipment and software.

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DOD scouts data network

From page 33

versities, and, accordingly, responsibility for its operation was transferred to the Defense Communication Agency (DCA) in 1975.

Arpanet was, and is, an experimental network used for research and development. Recognizing the need for a stable data communications network for ongoing operations, a contract was awarded in 1976 for Autodin II. Because of dissatisfaction with this effort, the DCA director formed a team to design and project costs for a survivable Arpanet-based data network as a possible alternative to Autodin II.

The results of an intensive five-month effort by DCA and the communications industry produced a DDN plan that describes a survivable, dependable and affordable common-user data system.

The design takes full advantage of existing networks and technology to minimize the risk of new developments. As the primary DOD data communications system, DDN will encourage user communities to adopt and evolve standards and objectives by providing a technically solid, low-risk and cost-effective system.

DDN became operational in 1983. At that time, Arpanet was split into two separate networks. Milnet was formed to handle unclassified traffic. The remainder of the network retained the name Arpanet and continues to serve an R&D function. Future enhancements to DDN will first be implemented and tested on Arpanet.

The original interface to Arpanet is a set of protocols specified by Bolt, Beranek & Newman and referred to as needed "1822," after the report number of the specification document. Because it involves unique hardware and software, 1822 is not an attractive choice for vendors. Accordingly, DOD has specified X.25 as an alternative interface to DDN.

Although DDN and the DOD protocol standards are linked together in the minds of many people, they are in fact separate and independent concepts. To use DDN, a DOD site is only required to have vendor-supplied equipment that conforms to the DDN interface specification (1822 or X.25). The implication of this requirement, however, is that Brand X computers will only be able to communicate with other Brand X computers, using the proprietary communications protocols of Brand X.

For full interoperability, equipment attached to DDN must also support the DOD protocol standards. This will allow that equipment to communicate with any other system on DDN that also supports these standards. Thus, from the customer's point of view, the best of both worlds is a vendor that supports both a DDN interface and the DOD protocol standards.

Codex unveils multiplexer

From page 33

load the device.

The product is said to provide automatic routing capabilities for congestion control and rerouting around failed links or nodes for networks containing up to three nodes. Rerouting is done transparently.

Dynamically allocated bandwidth is also a capability of the 6740, assigning bandwidth of high-speed links to active terminals and enabling a given link to support more terminal traffic.

For asynchronous devices, the 6740 provides a queuing capability that enables users to select a network destination and access that device on a first-come, first-serve basis.

The multiplexer sells for $6,000.

ISDN stands at the threshold

From page 33

cilities. One of the 64K bit/sec. channels can be used for voice while the other can be used simultaneously and independently for data. Because the voice will also be digital end to end, its quality will improve.

Another type of access, the primary rate interface, will provide 1.54M bit/sec. data rates, offering the opportunity to use ISDN for some types of local-area networks.

Currently, the telephone network uses different types of interfaces for different services, which include two-wire switched, two-wire dedicated, four-wire dedicated and services like AT&T's Dataphone Digital Service.

In ISDN there will be a small number of standard interfaces that will allow simple implementation, independent evolution and portability.

Planned interfaces

Besides the basic interface, known in ISDN parlance as 2B+D, and the primary rate interface, called 23B+D, several other interfaces are planned:

- The 3HO+D. Three 384K bit/sec. channels plus one 64K bit/sec. packet/signalization channel.
- The H11. Nonchannelized 1.54M bit/sec.
- The H12. Nonchannelized 1.920M bit/sec.
- Multislotted. Multiples of 64K bit/sec. (up to 1.536M bit/sec.) under customer control.
- Wideband. DS3 rates of 45M bit/sec.

All except the last could be carried on existing unloaded copper loop.

The existing central office equipment can be upgraded fairly easily to provide ISDN.

This, in turn, means that the service can be offered to the end user in an economical way.

Additional features of ISDN will include out-of-band signalization, which makes a host of new services feasible, including the ability of a switch to reach over to a new device — a data base machine — to retrieve pertinent prestored, user-defined instructions.

Setup time will be minimal. Bit error rates will be low, and because the system is digital, better quality channels will be available. In addition, ISDN will offer a substantial subset of the International Standards Organization (ISO) protocol stack, meaning that data will be intrinsically protected from errors by a Level 2 link control procedure (such as LAP-B or LAP-D) and that routing and other end-to-end functions will be available.

Compatibility with IBM System Network Architecture (SNA)-type networks is predicted and may be achieved directly or via protocol gateways.

The former approach is more efficient and would be achieved if SNA layers were made to conform with the ISO protocol stack.

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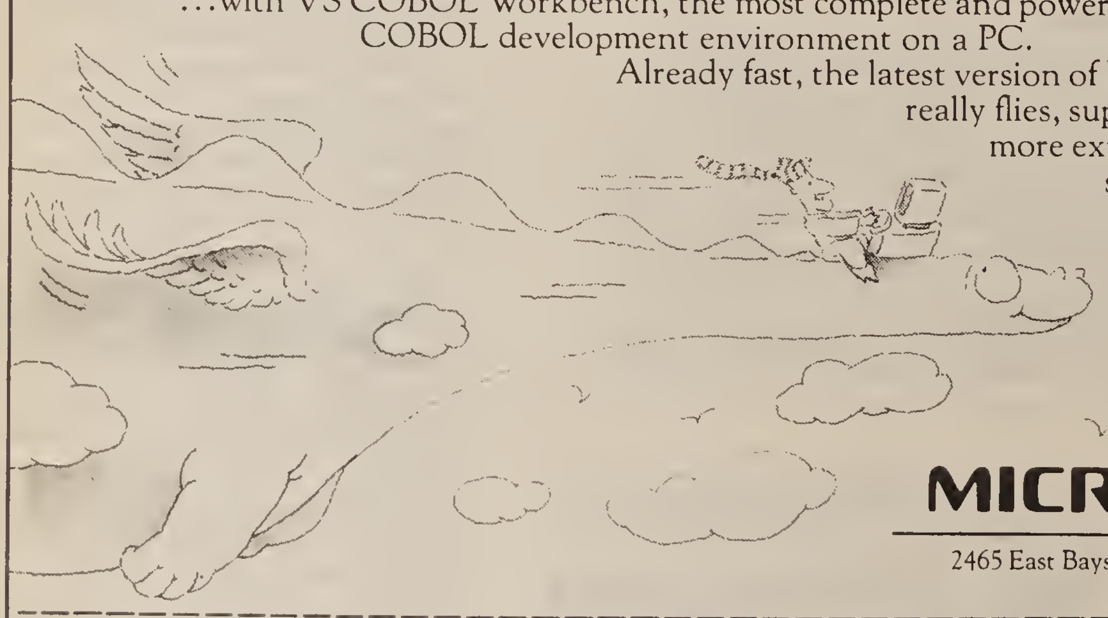

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SYSTEMS & PERIPHERALS

HARD TALK
James Connolly
CW Senior Editor

Waiting on flat panel displays

There are those in the computer industry who would tell users that the era of the flat panel display — a display that would trim a foot off the space requirements of existing CRT terminals now sitting on desktops — is at hand.

It is true that there are flat screen devices on the market today and that those screens show up in products ranging from $600 laptop personal computers to $7,000 IBM 3290 terminals in computer operations centers.

But a quick look at the technology shows that flat screens are several years to an eternity away from replacing the CRTs now found in the hundreds of IBM 3270 terminals or ASCII devices attached to mainframes and superminis in the average U.S. corporation. Progress for flat screen technology apparently will be slow, though steady, with slight progress being made in 1986.

"Flat screen is really just beginning. People have been talking about this. I myself have been working with it, following it actively for more than 10 years," noted Thomas Harriman, vice-president for development at Conrac Corp., a Stamford, Conn.-based manufacturer selling displays and other electronics components in the OEM market. Harriman said he first saw flat screen technology in the late 1940s, when vehicle manufacturers tried to develop products for the U.S. government.

"There is not today a good product available in terms of a flat CRT," Harriman said, although he admitted RCA Corp. and alot of Japanese companies have invested "a lot of money into that.

See **WAITING** page 39

Gould adds superminis

Unix-based software tools, high-end processors debut

By James Connolly

FORT LAUDERDALE, Fla. — Gould, Inc.'s Computer Systems Division last week announced high-end additions to its Powernode family of superminicomputers and a series of AT&T Unix software products.

The PN6040 is an extension of Gould's 2-year-old PN6000 family and provides the performance of a Digital Equipment Corp. VAX-11/785, according to a Gould representative.

The PN6040 features two models. The Model 1 costs $38,900, and the Model 2, featuring tightly coupled dual CPUs, costs up to $150,000. The PN6040 supports up to 128 users, with optimum performance for 32 to 64 users.

Addition to PN9000 series

The PN9050 Scientific Processor is an addition to the PN9000 series. The PN9050-SP provides 25% more performance at 25% less cost than comparable systems such as the DEC VAX-8600 and VAX-8650, Gould claimed. Prices for the PN9050-SP range from $275,000 to $400,000.

The Powernode systems support AT&T Unix System V and the University of California at Berkeley Unix Version 4.2.

Gould also announced a joint marketing agreement with Sun Microsystems, Inc. under which Gould will provide Sun engineering workstations to Powernode users. Gould also said it has adopted Sun's Network File System as a standard for a distributed processing environment.

Secure version of Unix

Gould's Unix announcements included Version 1.2 of its UTX/32 operating system, which the company claims is a secure version of Unix complying with the first level of U.S. Department of Defense standards for security.

The secure version costs $4,500 for 16 users, $9,000 for 32 users and $27,000 for 128 users.

Gould also announced a Fortran 77 compiler designed to provide a 25% increase in performance over previous versions and the availability of various third-party Unix-based packages designed for use on Gould systems.

HARDWARE NOTES

Burroughs works on parallel processor

Burroughs Corp. is said to be engaged in parallel processor research at its **Austin, Texas,** research center. The evolving product will encompass the development of a new language, a microprocessor-based parallel architecture and an interconnection scheme. Although plans are not yet definite, a single-processor version of the system could be out as early as the end of 1986.

The company also plans to best its top-of-the-line **A 15** mainframe with an **A 17** sometime soon.

■

Burroughs also is boosting its sales force nationwide. The **Detroit**-based vendor, with 3,000 salesmen already on staff, kicked off its 1986 marketing efforts with "help wanted" advertisements for 200 sales representatives to work throughout the **U.S.** A spokesman said the increased staffing is unrelated to specific product line developments.

■

Prime Computer, Inc. and **CSP, Inc.** of **Billerica, Mass.**, have announced a joint development effort to add array processing capability to **Prime's** 50 series superminicomputers. Officials at Prime and

See **NOTES** page 40

INSIDE

Early users of National Advanced Systems' 7900 storage device report the system exceeds their expectations/**38**

Gate arrays are replacing glue logic chips/**39**

NEW THIS WEEK

- Logicraft introduces Grafvax, a DEC-compatible workstation
- Sun Microsystems offers its Sun-2/160T workstation
- For more on these and other new products, see pp. 83-109.

INSTANT ANALYSIS

"It isn't so much that the plug-compatible manufacturers are gaining market share. It's that IBM is letting them win it."

— **Bob Djurdjevic, Annex Research analyst**

Wang steps up marketing, conversion services for obsolete IBM systems

Competitors pick up where Big Blue left off

By James Connolly

LOWELL, Mass. — An IBM policy of obsolescence is opening new market opportunities for IBM's competitors in the minicomputer market, according to a senior executive for one of those competitors, Wang Laboratories, Inc.

The opportunities provided when IBM leaves customers no upgrade paths to new systems are gaps that companies such as Wang, Digital Equipment Corp. and Hewlett-Packard Co. should bridge, said Carl Masi, senior vice-president for marketing at Wang.

Masi said in a recent interview that IBM's decision to drop support for IBM System/34 software on Feb. 21 [CW, Sept. 16] gave Wang a chance to renew the marketing push for a System/34-to-Wang VS conversion service that Wang introduced early in 1985. Masi, noting that DEC and HP offer their own conversion aids for migrating System/34 RPG-II applications, said IBM's mid-range competitors can steal IBM customers and keep them by ensuring continued compatibility up and down product lines, such as the Wang VS family of processors.

"The mid-range is where IBM has had the most difficulty and the least market share. They have very stiff competition in that area with DEC, Data General, HP and Wang, and the reason they have that competition is that they have continued a policy where they obsolete products. First it was the System/3, then the System/32 and now we have learned IBM will drop the ax on 50,000 to 60,000 System/34 owners," Masi said.

However, at least one consultant who specializes in installation and systems development with IBM small systems noted that much of the customer rush to convert from the System/34 is complete. He observed that many System/34 customers relied on their own personnel or consultants — rather than IBM — for software support, and he added that many System/34 users remain content with that machine seven years after it was first delivered.

Masi noted that the long-expected death of the System/34 was intended to boost sales of the System/36, and, he commented, "The user who was told a few months ago that he had to move to the System/36 knows for sure that when he has to move again, it's going to be excrutiating." He said other IBM systems that are doomed and give companies like Wang opportunties include IBM's 8100 distributed processing system, the System/38, the 5520 administrative system and the Displaywriter.

Masi complained that the user community and the press should "react more violently when IBM drops the ax on 50,000 users." He noted that managers of large IBM shops are used to being told by IBM that they have to upgrade but that small companies are beginning to react by looking for alternatives to IBM.

Masi said that to take advantage of the System/34's death Wang repriced its VS 85 to show a shorter migration path from the VS 65 and has embarked on advertising and educational programs to promote the RPG-II conversion service.

Two users evaluate NAS' 7900 solid-state storage product

Hard-disk subsystem boasts fail-safe backup

By Donna Raimondi

Two early users of National Advanced Systems Corp.'s 7900 solid-state disk storage subsystem with a fail-safe hard-disk backup claim the system exceeds their expectations.

"We have gone through two power-down cycles — one deliberate and one where we had a power failure — and the box performed flawlessly," said Frank Stampehl, data storage supervisor at Monsanto Co. in St. Louis. But while the power backup is the reason Stampehl bought the 7900 Semiconductor Disk Subsystem, it has not been the device's main advantage.

Sundstrand Corp. in Rockford, Ill., has had similar experiences, said Dale Naleway, principal systems programmer at the aviation products manufacturer's headquarters. The company has been evaluating its 7900 system since its installation Sept. 21.

The major bottleneck for Monsanto's data processing, according to Stempehl, was a 30-track IBM Multiple Systems Integrity (MSX) data set, a table that handles data set enqueues and dequeues — placing and removing items on a queue — that was accessed whenever users went through a data set allocation. MSX meant response time delays, especially for batch jobs, Stampehl said.

The MSX data set was previously the only data set on an IBM 3350 disk device. After being put on the 7900, it showed a 94% improvement in service time — from 16 msec to 1 msec — according to Gerry Oliver, a specialist in performance analysis, "What we saw was the improvement in data set allocation to batch jobs." Prior to the 7900 move, there was a waiting queue to the data set 30% of the time, Oliver said. The queuing frequency has since decreased to 3.5%.

Three of Monsanto's four IBM mainframes are attached to the 7900 — a 3081 Model G and two 3033 Model Us, all running under IBM's MVS operating system. All four systems share mass-storage devices, which add up to 150G bytes on 240 spindles of IBM 3380 storage and about 30 spindles of IBM 3350s. Three Storage Technology Corp. 4305 solid-state devices are used for paging.

The IBM 3081 mainframe that was averaging about 170,000 start I/Os in the two-hour afternoon peak period increased 82% to 310,000 start I/Os. "Because it relieved our No. 1 bottleneck, anything else that we get is a side benefit," Stampehl said.

"It did give us increased CPU utilization," Stampehl added. "We got about 4% to 5% more work out of our CPUs during that peak period. So from a capacity viewpoint, it added a little bit to the life of the machine."

Monsanto's 7900 is a 32M-byte storage unit divided into four logical volumes, two of which are in service at this time. The first volume is used for the MSX data set, the second for a communications data set that is part of the Uccel Corp. UCC7 scheduling package for the batch work load. The systems' IBM JES2 checkpoint, will be added in January to the third volume. The last addition will be a high-activity work data base for an IBM IMS data base application.

At Sundstrand, service time to the MSX data sets for checkpoints that govern the sharing of DASD among CPUs was reduced from 13 msec to 1 msec or less. "Also, we have been able to drive our two processors at an average of about 14.7% more CPU utilization by taking that bottleneck away," Naleway said. He said he was surprised to find that the MSX data sets had been such a problem on his systems.

The company's Amdahl Corp. 32M-byte Model 5860, which runs two copies of IBM's IMS on it, improved CPU utilization by about 5.9%. The 32M-byte Amdahl 5870, which runs in an IBM TSO environment for about 70 users and supports 150 On-line Business Systems' (OBS) Wilbur users, showed an improvement of 16.5%. Both machines run batch jobs as well. The 7900 system Sundstrand bought is a 128M-byte version partitioned into eight logical volumes.

Wilbur prompted look at 7900

OBS' Wilbur, a TSO-type editor that is not interactive, prompted Sundstrand to look at the 7900 in the first place. Wilbur has its own paged data sets that are very response oriented, Naleway said. But Wilbur also has a recovery capability so that if it fails, the active screen sessions are saved and paged in and out of paged data sets. If Wilbur abends or the system crashes, it can recover data by going back, reading the paged data sets and capturing what the users were working on.

Traditional solid-state disk drives could not support Wilbur's recovery capabilities because during a power outage, solid-state devices lose everything.

A measuring system that collects data to track logon and logoff time and the response time of a canned group of transactions showed a 20% reduction in the time it took to log on or log off or to execute the canned transaction group.

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Waiting on flat panel displays

From page 37

Lots of people think that flat panels are sort of an already arrived product because people say, 'Well, can't you get a portable computer with, for instance, an LCD panel on it.' Well, yes you can, but you cannot read it. Now that will change this year. There will be a couple of good monochrome flat panels for portable computers for half-page display. But they are not on the market yet," Harriman added.

Harriman said he expects development of monochrome LCD displays at the low end of the market to continue, but noted that his company's main interest is in color displays. He warned that he does not expect color displays using plasma technology, as does the 3290, to be available at a fair price in the future.

'Beautiful flat panel'

Praising the 3290 as a "beautiful flat panel that is reliable with high resolution," Harriman noted that the cost to achieve such display quality bars any attempt to place the technology on the average user's desk. In addition, he said that the steady improvements being made in the quality of CRTs minimize the need for flat panels in most applications. Even in computer-aided design and other fields requiring sharp graphics, few users can detect the 1% geometric error that occurs in the corners of a CRT display, Harriman said.

He added that the strongest selling points for the flat screen will be low power consumption for portability and a small footprint on the desk.

But another industry observer, Dataquest, Inc. analyst Bob Sanekoff, noted that even footprint is not as great a concern for many users, such as programmers, as it may be for managers.

"Programmers don't care about space or even resolution. Why should you spend even $1,500 or $2,000 for a terminal when you can do just as well with something that costs $599?" Sanekoff asked.

Flat panels will not replace CRTs

Sanekoff predicts that it is highly improbable that flat panels will begin replacing conventional CRTs within two years and that they may show up in place of CRTs in three or four years. "Applications for flat panels are going to be those with low information content usage, such as industrial and instrumentation or automotive, with flat panels in the dashboard of your car. For applications requiring 2,000 characters or more, the benchmark is still the CRT. As for the flat panel that hangs on the wall at home or pulls down from above your desk, I hope I live that long," he concluded.

But the top-dollar 3290 and the portable computer screens that can't be read in bright light or at the wrong angle at least have broken ground.

It appears that a handful of American and a score of Japanese firms will be digging much deeper in the next few years. But there is no reason to hold great hope for flat panels that will take charge in the 3270 and Digital Equipment Corp. VT200 worlds in 1986 or maybe even 1990.

Gate arrays take glue logic's place

By Edward Warner
Computerworld News Service

SAN JOSE, Calif. — If a person peered inside a typical computer, he would see a CPU, memory chips and dozens, even hundreds, of what are known as glue logic chips.

The market for glue logic, which enables the CPU and memory to work together, is growing by 20% annually while the rest of the semiconductor market is in a recession.

Glue logic chips are small and simple, but they are not small potatoes: U.S. electronics vendors spent $4 billion to $5 billion on them in 1984, according glue logic vendor Xilinx, Inc. By 1990, said Xilinx President Bernie Vonderschmitt, about $8 billion to $9 billion will be spent on glue logic.

Because of a new development, however, there will be fewer glue logic chips in each computer by 1990, according to analyst Howard Bogert, of the San Jose, Calif.-based research firm Dataquest, Inc. Glue logic chips, Bogert said, are being replaced by gate arrays, a more sophisticated semiconductor. Bogert said that one gate array might replace 200 glue logic chips, which, at $1 apiece for glue logic chips, means a $200 savings.

Bogert estimated the gate array chip market grew by 40% in 1985. Gate arrays are custom-designed chips, but they are easily adapted to computer-aided design because each gate, a logic switch, can be used as a logic building block. As a result, while the price of gate array chips has not fallen, the level of sophistication has increased dramatically, Bogert said.

To reduce costs, Vonderschmitt's firm is touting a technology it developed in which a gate array gains its logic road map without a mask. Under the Xilinx system, the user designs the gate array chip's operation by writing a software program, using a $10,000 Xilinx Logic Cell Array development system.

Vonderschmitt said the Xilinx gate arrays eventually will make gate array-based glue logic as inexpensive as commodity chips — such as memories — are today. However, Xilinx programmable gate array chips now cost $50 to $60 each. Vonderschmitt said he expects the cost will drop to $15 by the year's end.

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Turnkey system automates school administration tasks

By Mitch Betts

ROCKVILLE, Md. — Infocel, Inc. has introduced a turnkey system, based on Prime Computer, Inc.'s Series 50 superminicomputers, that automates a variety of administrative and management functions for medium and large school districts.

Infocel is targeting 14,000 large school districts, many of which are using older minicomputers or service bureaus, a company spokesman said.

Infocel's Schoolplus system features 26 integrated software modules for financial management, administrative support, student information and instructional support, according to the spokesman.

Supports 32 or more terminals

The turnkey system can support from 32 to more than 250 terminals in a network that spans the school district, he said.

The modular software includes word processing, electronic mail, spreadsheets, scheduling, a data base management system, library management, student records and attendance tracking as well as traditional financial management programs, the company said.

The turnkey system is said to include a telecomputer that automatically calls parents when students miss school.

An important feature is a master course schedule builder, designed to automate the labor-intensive and costly task of scheduling students and classrooms, Infocel officials said.

The system price varies with the configuration but typically ranges from $125,000 to $750,000, the vendor said.

Notes: AT&T touts switch

From page 37

CSP, which manufactures programmable floating-point array processors, said products developed under the agreement will be targeted toward **Prime**'s customers in the scientific and computer-aided engineering, manufacturing and design fields.

■

AT&T Bell Laboratories scientists have demonstrated what they say is the fastest semiconductor device ever built. The switch will be useful in communications equipment, microprocessors and computer memories, **AT&T** said. Designed and fabricated in collaboration with the **National Research and Resource Facility for Submicron Structures** at **Cornell University** in **Ithaca, N.Y.**, the switch can turn an electronic signal on or off in 5.8 picoseconds (trillionths of a second). The previously reported time was 8.5 picoseconds.

■

Fuzzy logic on a chip, for applications requiring real-time response such as missile command and control, robotics and manufacturing operations, was demonstrated by **AT&T Bell Laboratories** recently.

The chip will be used initially for robot arm control, the company said. Building the operating instructions of an expert system into a chip's circuitry rather than writing them in software is said to avoid retrieval of instructions from external memory. The fuzzy logic is said to reduce the number of rules required to act on problems.

AT&T researchers **Masaki Togai** and **Hiroyuki Watanabe** have achieved a semiconductor speed of 80,000 fuzzy logic inferences per second, the company said. The chip's primary benefit is that it can accept incomplete or vague information and make a fast and reasonable response.

■

IBM has made **Oracle Corp.'s Oracle** data base system available for most of its product line, including the **System/38**. The **System/36** reportedly will be next to accept Oracle.

However, at least one industry observer says the System/36 announcement is intended just to pave the way for Oracle implementations on future System/36 versions and that existing versions probably cannot fully use Oracle.

■

Rexon Business Machines Corp. of **Culver City, Calif.**, has made **Microsoft Corp.'s Xenix System V** operating system available as an option to its four-member family of 16-bit **Intel Corp. 80286** microprocessor-based computer systems. The Xenix System V, which costs $495, is the result of an effort beteen **AT&T** and Microsoft to include all features of **Unix** in the Xenix system, said Rexon Vice-President of Sales **Mike Lucey**. The system is available as either the operating system, the software development system or the text processing system.

■

Computer Systems, Inc., maker of the **Pixel 80 AT&T Unix**-based supermicrocomputer, has changed its name to **Xepix, Inc.** and moved from **Woburn, Mass.**, to **Nashua, N.H.** The company was recently acquired by **Xeta, Inc.**

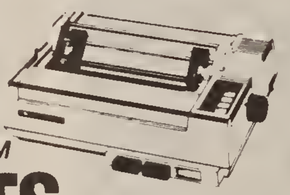
Wyse trims WY-85 price, adds option

SAN JOSE, Calif. — In a move that one analyst said could cause the terminal industry to lose more than 20% of its profits, Wyse Technology, Inc. has slashed the price of its WY-85 display terminal by 25%.

The price for the WY-85, which is compatible with the Digital Equipment Corp. VT220, was cut from $799 to $599. The company has added an optional amber screen.

A Wyse spokesman said the price cut was made possible by increases in production volume at Wyse's Taiwan manufacturing plant.

The WY-85 with the amber screen option costs $629.



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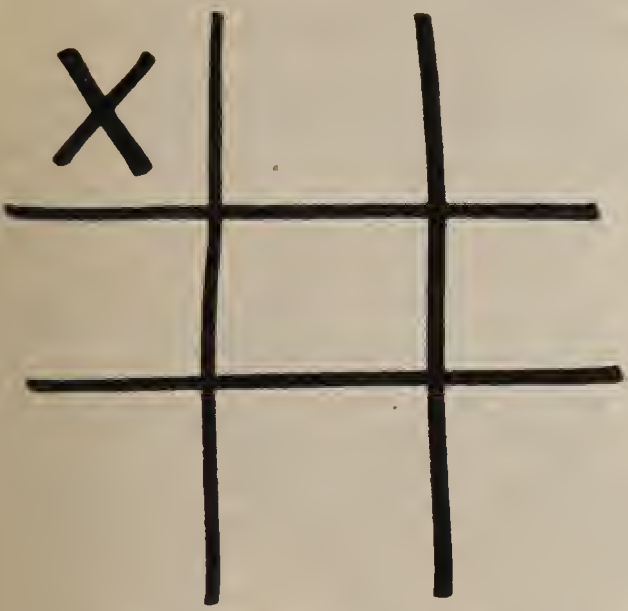

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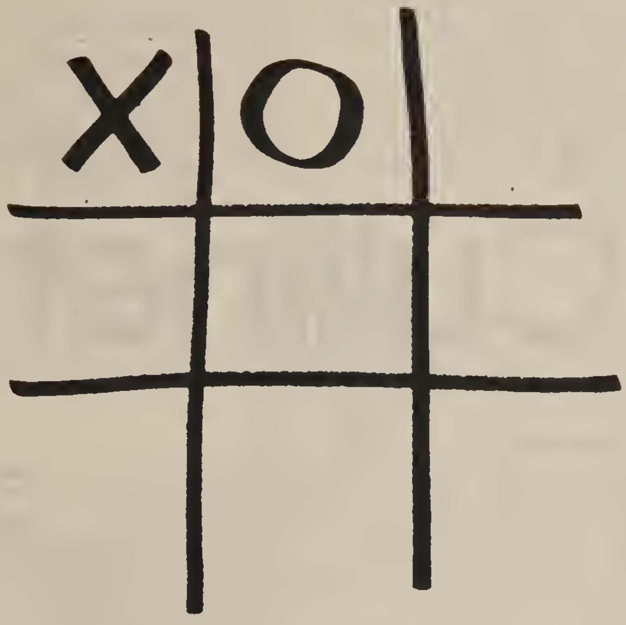

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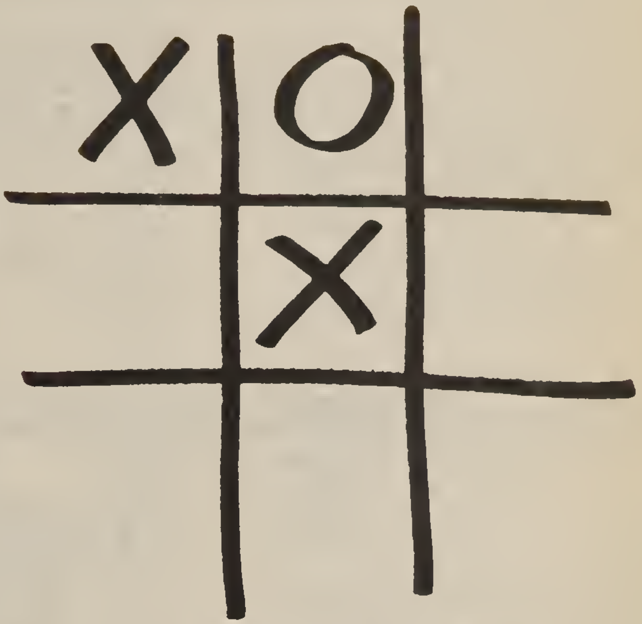

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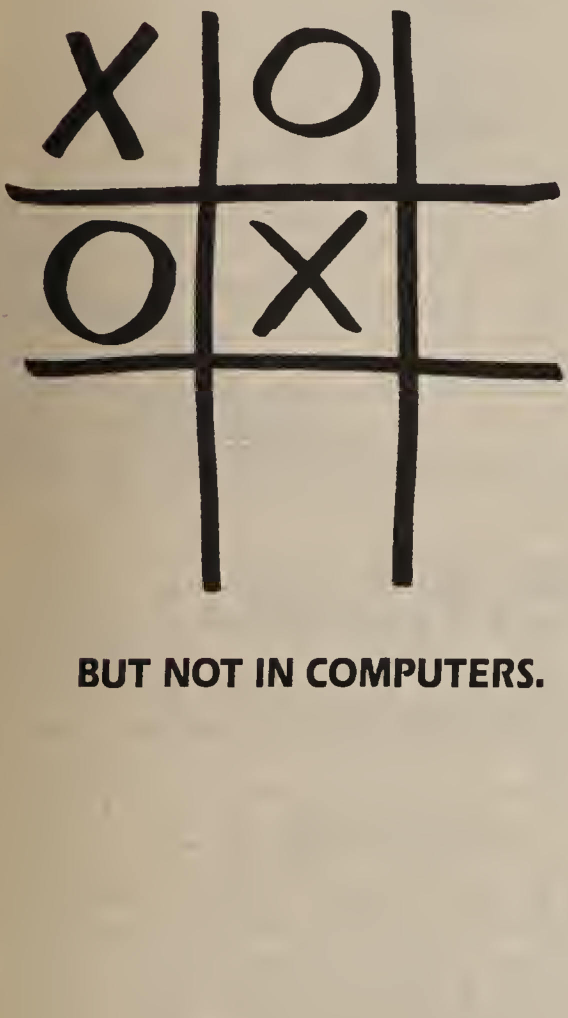

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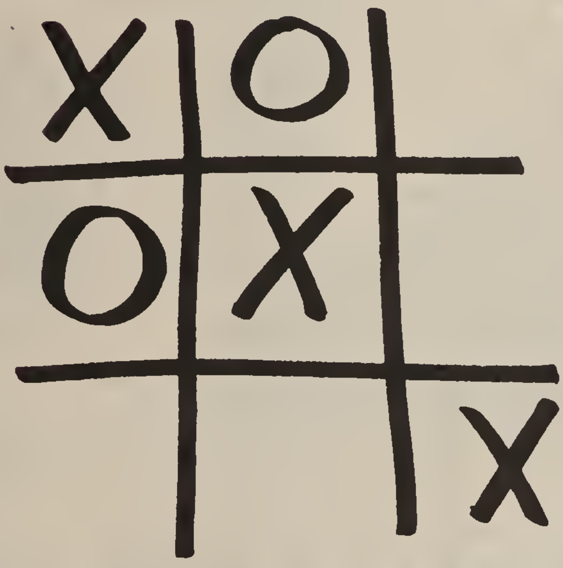

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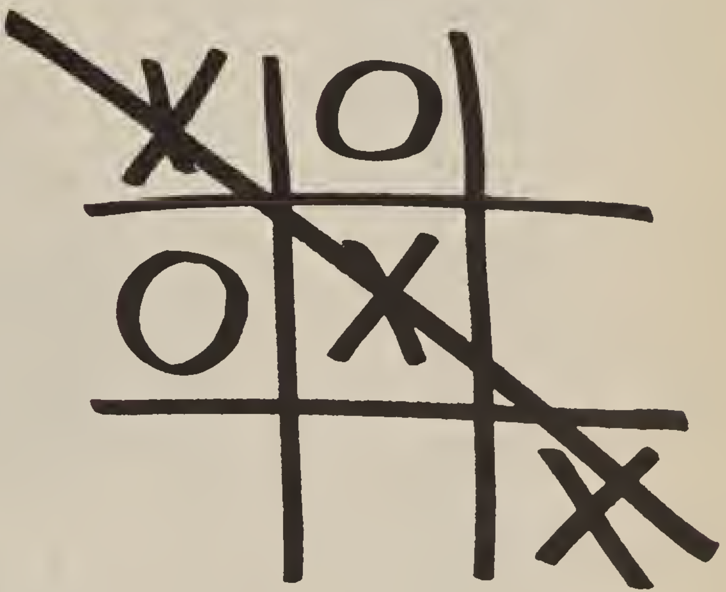

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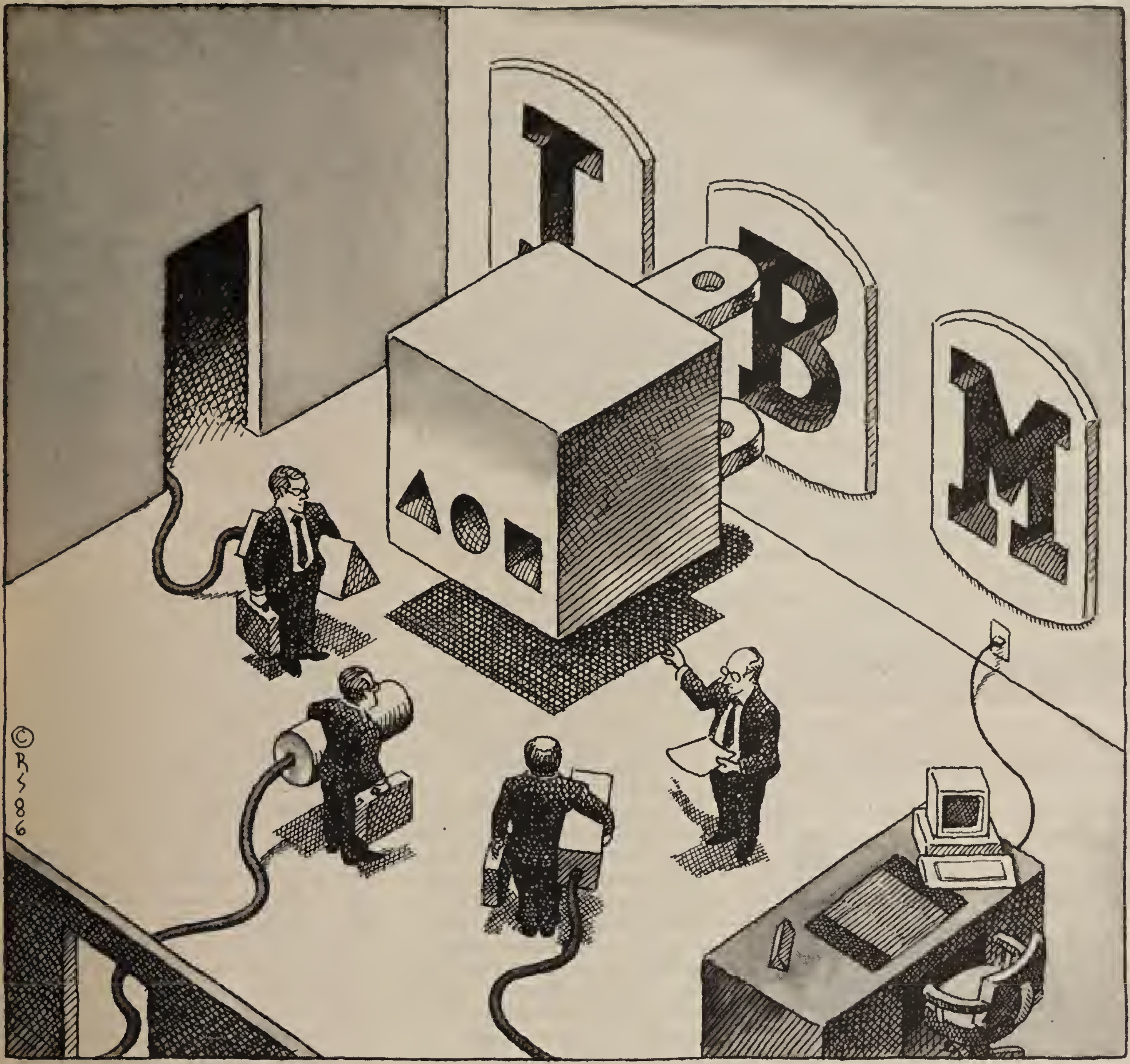

ILLUSTRATION BY ROB SAUNDERS

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Communications standards will provide the links to tie together IBM and a list of other vendors/60

Integrating the Office

MIS pushes for IBM connection

By GLENN RIFKIN

While the major computer vendors built an industry around the sobriquet "office automation," corporate America stood by wondering what this ambiguous term meant and how in the world this concept would be achieved.

Blanket OA solutions always seem to be working at someone else's company. But close inspection of even the most successful implementations reveals limited capabilities and isolated productivity gains. How effective can an office system be if large corporations with disparate computer systems are unable to do something as rudimentary as transfer a revisable form document from one desktop to another?

At Kendall Corp., a billion-dollar hospital supplies manufacturer in Boston, Paul McDonald discards the term "office automation." "I hope I never hear it again," he says. Instead, as director of end-user computing, McDonald looks for technologies that will work across the corporate computing environment, departmental computing environment and personal computing environment.

For McDonald and his fellow MIS managers, it is clear that one must walk before one can run. In the office, that means making connections between the mainframes, minicomputers, microcomputers, terminals and peripherals that allow the simple sharing of data. That basic connection, however, is simply not in place in the multivendor environment as this new year begins.

MIS managers must figure out which vendors to believe and which to avoid, how to explain to end users that they must wait for what they perceive as simple communications and how to manage this confused office of the present, as the office of the future remains out of reach, a hazy vision in the distance.

At the center of this confusion is IBM. With control of both the high and low ends of the data spiral, IBM plays the music to which all others must dance.

> *MIS managers must figure out which vendors to believe, how to tell end users they must wait for simple communications and how to manage this confused office of the present.*

In order to provide true information highways in the office, a company must hook into IBM at several levels, including its Systems Network Architecture (SNA) and Distributed Office Support System (Disoss), as well as with IBM's Personal Computer and its Token-Ring local-area network. Inherent in these hookups is compatibility with such protocols as Document Interchange Architecture (DIA); Document

Continued on page 44

Rifkin is a Computerworld *senior editor.*

MIS pushes for IBM connection

From page 43

Content Architecture (DCA); LU6.2, the logical unit that provides access to SNA and allows end users to communicate; and SNA Distribution Services (SNADS).

Though IBM is not the only standard-bearer — the International Standards Organization (ISO) model has gained significant support within both the vendor and user communities — it is by far the strongest. Virtually every major computer maker, from Digital Equipment Corp. to Wang Laboratories, Inc., has taken steps toward gateways to and compatibility with IBM in the office.

In fact, 18 major vendors are scheduled to meet in Arlington, Va., this Thursday — under the auspices of the Computer and Communications Industry Association — to establish a group that will promote compatibility standards among different vendors' computer equipment.

IBM itself has not made great strides in office systems (see story page 51). With its own varied and incompatible offerings, IBM's information systems solutions are currently confusing and often unattractive. Some IBM shops such as Kendall are sticking with IBM solutions because it is too late and too costly to make a switch.

"There are things I love about the DEC system," McDonald says. "Their way of passing data is far more efficient than what we are getting right now with IBM. But we have been an IBM user for years, and as our company has gone through tough years due to the economy, we are becoming leaner and leaner with limited resources to apply to these problems. So we purposely said we will pass up some possible benefits by staying with IBM."

IBM did not rise to its lofty height by making it easy on competitors. The Armonk, N.Y.-based giant continues the evolution of SNA, revamping its infrastructure and creating a morass of confusion that often leaves competitors a day late and a dollar short. For the vendors, there is an increasing reliance on third-party developers and OEM agreements to keep pace with this moving target.

Vendors and users alike have waited for standards to emerge to facilitate linkups (see story page 60). Though it may not be the standard for all users, SNA has become a de facto requirement for any organization with an IBM host environment. A complex, multilayered architecture, SNA is making the transition in emphasis from a hierarchical to peer-to-peer connection using the LU6.2 protocol as the catalyst for that transition.

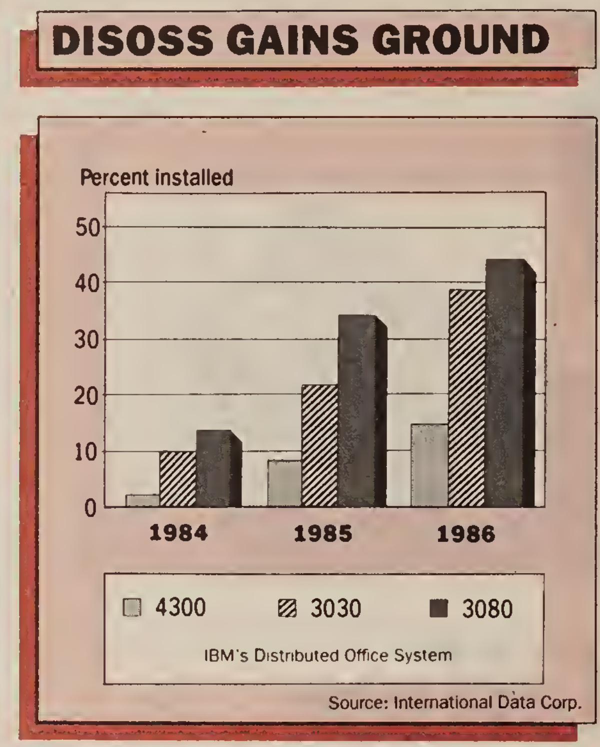
IBM states that it will use Disoss to bind its own incompatible office products. Therefore, other vendors have been scrambling to ready Disoss connections. As IBM's DCA emerged as a front-runner in the race for a document format standard, competing vendors again reached for connectivity.

Disoss, which provides library, distribution and system services, has had a checkered existence. A 1985 Gartner Group, Inc. survey of 150 user clients revealed that only 10% used Disoss, although the vast majority were considering installing it within the next 12 months. Consultants estimate that Disoss is implemented in no more than 400 user sites around the country, and where it has been installed, it often brings more grief than joy.

"Very few people I know have achieved a lot of success in implementing Disoss at the corporate level," says Michael Hammer, a Cambridge, Mass.-based consultant. "Some have tried, but success comes at a pretty high price. Users have told me when they do get Disoss up, they don't do much with it."

Companies such as Kendall, which have already implemented Disoss, are not reaping rewards yet. McDonald points out that it was extremely difficult to get Disoss up and running; once in place, Disoss has proven even more difficult to use to transfer data in revisable format. "This is where the rhetoric and the action don't have much in common," McDonald says. "We don't see this transition as being smooth for at least a year."

Disoss is considered a resource hog, and the expense to acquire and install it is augmented by the high cost of maintaining it. Nonetheless, IBM is committed to it, and therefore, its place in the office seems secure.



Source: International Data Corp.

Despite its growing popularity, Disoss is expensive to implement and difficult to run.

Keys to the kingdom

Though industry analysts have fashioned careers around guessing the future direction of office information systems, it has been only in the past two or three years that any reasonable consensus has emerged. Hooking into IBM in the office environment, consultants agree, will come through connections to Disoss using LU6.2 along with the compatibility with DCA, SNADS and possibly others such as IBM's Professional Office System and SQL.

Office vendors such as DEC, Hewlett-Packard Co., Data General Corp., NBI, Inc. and Wang, along with newcomer AT&T, have come to understand, however reluctantly, that creating top-notch proprietary office products is not enough. End users are becoming more sophisticated, demanding shared data from all levels of the organization. They are not concerned about exotic linkups and strains on resource budgets. In addition, the ubiquity of the IBM Personal Computer gives MIS managers headaches as they determine how to tie these stand-alone machines into seamless members of the information network.

"What MIS is afraid of, whoever the players are, is that even if they supply the greatest piece of hardware since sliced bread, that isn't all there is to it," says Peter Lowber, director of information services for the Yankee Group. "It is a systems solution and a systems sale. They are looking for SNA support, DIA and DCA support, Disoss support and for LU6.2 as a way of providing peer-to-peer communications in a complicated network.

"These are not suddenly new issues. We've talked about them for a few years now. But they are in fact on the top of MIS' priority list right now," Lowber says.

Fortune 500 companies reading press reports and vendor hype would expect 1986 to be a year of implementation rather than exploration. But for many, pilot projects continue to involve the automation of offices and creation of information networks.

Many MIS managers face dual dilemmas: Did we jump on the wrong bandwagon too soon, and if we did, how can we straighten out the mess without dumping all of the current equipment and know-how? Both those in multivendor environments and those committed to a single vendor must start planning for the next round.

Ironically, all the fuss about emerging standards such as LU6.2 and Disoss seems like much ado about very little. These protocols, after all, are designed to permit the most rudimentary of capabilities, such as transferring a revisable form document and bringing applications to and from the host. True information networks with integrated data, text, voice, graphics and images remain on the horizon. Yet the vendors know better than anyone that they must put in the foundation before building the house, and the race is on to get these underpinnings into production. They recognize these protocols as the first open doorways to IBM and have gone after them with abandon. Consultants and experienced users agree that the MIS manager must push the vendor hard to get commitments on future direction. A statement of direction is not worth the paper it is printed on if a customer is kept waiting indefinitely for solutions that competitors can already deliver.

"MIS guys are not dumb," says Michael Zisman, chairman of Soft-Switch, Inc. "If they find a better

Continued on page 50

MITCHELL J. HAYES

Patty Seybold

Is Disoss the answer?

By PATTY SEYBOLD

The sheer volume of personal computer usage, coupled with the proliferation of disparate departmental systems, puts pressure on MIS to link all these computing islands together. An obvious solution is the following: Tie everything into the mainframe, and use an IBM host to store and distribute information needed by everyone in the organization regardless of the denomination of their computer. The fact that most other vendors espouse IBM's Distributed Office Support System (Disoss) answer makes this solution seem even more attractive. But is it?

Probably not. The problem is that Disoss, like many IBM offerings in their infancy, is not particularly alluring. Designed as an architectural umbrella to solve IBM's own problem in dealing with incompatible word processing programs and mail systems, Disoss does not cut the mustard in providing ecumenical document interchange, mail and filing services.

On the other hand, Systems Network Architecture Distribution Services (SNADS), with the LU6.2 peer-to-peer capabilities and Advanced Program-to-Program Communications, now offers programmers the foundation to build new intersystem bridges with more usable interfaces and better functionality than the Disoss services provided by IBM. And, because of the democratic nature of SNADS, it is no longer necessary to route everything through the host.

IBM's two standards, Document Content Architecture (DCA) and Document Interchange Architecture will also continue to play a key role in intersystem communications. However, IBM's Disoss services will probably be less widely used.

The role of Disoss. When would you use Disoss services? If yours is an environment in which the predominant office systems are IBM's and users have opted for a variety of IBM solutions (5520s, Displaywriters, 8100s, Personal Computers and the Professional Office System using VM), then the Disoss environment provides one way to tie these users into a common electronic mail

Continued on page 48

Seybold is publisher of the "Seybold Report on Office Systems," published in Boston.

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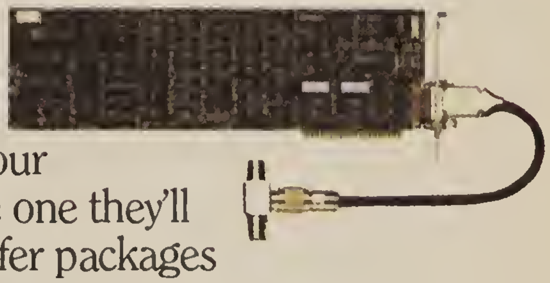

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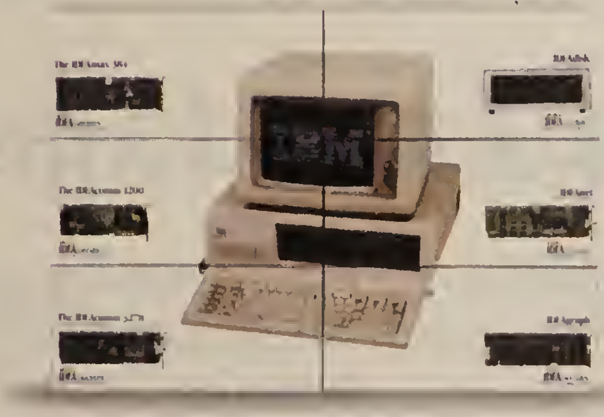

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Continued from page 44

network and to provide them with editable document exchange. Bear in mind, however, that Disoss' delivery services work differently for users on different types of systems. Do not underestimate the setup and training time required.

You may also be considering using the host as a central repository for document storage and retrieval using Disoss' document library services. That is not a good bet. The library services are tough to access, do not allow very flexible searching and are probably more trouble to maintain than they are worth to the end users.

Intervendor support. If your users live in the typical multivendor environment — a mix of IBM, Digital Equipment Corp., Wang Laboratories, Inc., Data General Corp. or Hewlett-Packard Co. equipment — Disoss will be less relevant as a common denominator approach. In this situation, third-party solutions and/or patience are often the best answers.

> ”
>
> ***If a firm's users live in the typical multivendor environment, Disoss will be less relevant as a common denominator approach. In this situation, third-party solutions are often the best answers.***

Office users' primary needs for intersystem communications are file transfer, editable document exchange and electronic mail. Eventually, electronic mail should subsume the other two. In other words, we will be able to ship files of all types as well as editable documents via electronic mail from one vendor's system to another's.

While we wait for this miracle of intersystem communications to become reality, what steps should we take? If users truly require editable document interchange among disparate systems (and not just print image or ASCII file transfer), the next step is to determine whether an interactive communications-based approach or a media conversion approach is most appropriate. Generally, media reading is most appropriate for one-time conversions.

Then, look for solutions offering editable document exchange among your particular brands of systems. These conversion solutions may come in the form of black boxes or software programs designed to run on the mainframe or as software options for existing office systems.

Why not use IBM's DCA for the purpose of intersystem document exchange? Unfortunately, DCA, while not the least common denominator approach, does not support many of the formatting conditions found in other vendors' word processing programs. So for users who insist on editable document transfer in a multivendor environment and are impatient about cleanup, IBM's DCA is not the best answer.

Many users just want to move information from system to system, unconcerned with the editability of heavily formatted word processing documents. The transparency of that transfer process is the most critical feature.

Unfortunately, IBM's solutions require too much knowledge and patience on the part of end users. For example, to use Disoss document distribution, you must know on what node each addressee resides.

At this point, look to third-party suppliers like Computer Corporation of America, Computer Solutions, Inc. and Soft-Switch, Inc. to help fulfill your needs.

The Personal Computer conundrum. So what is the most effective way to tie Personal Computers into corporate networks? We see two scenarios emerging. For groups of avid Personal Computer users accustomed to grappling with IBM's PC-DOS, a Personal Computer local-area net is probably appropriate, with the necessary gateways to the mini or mainframe — wherever the most used data and applications reside.

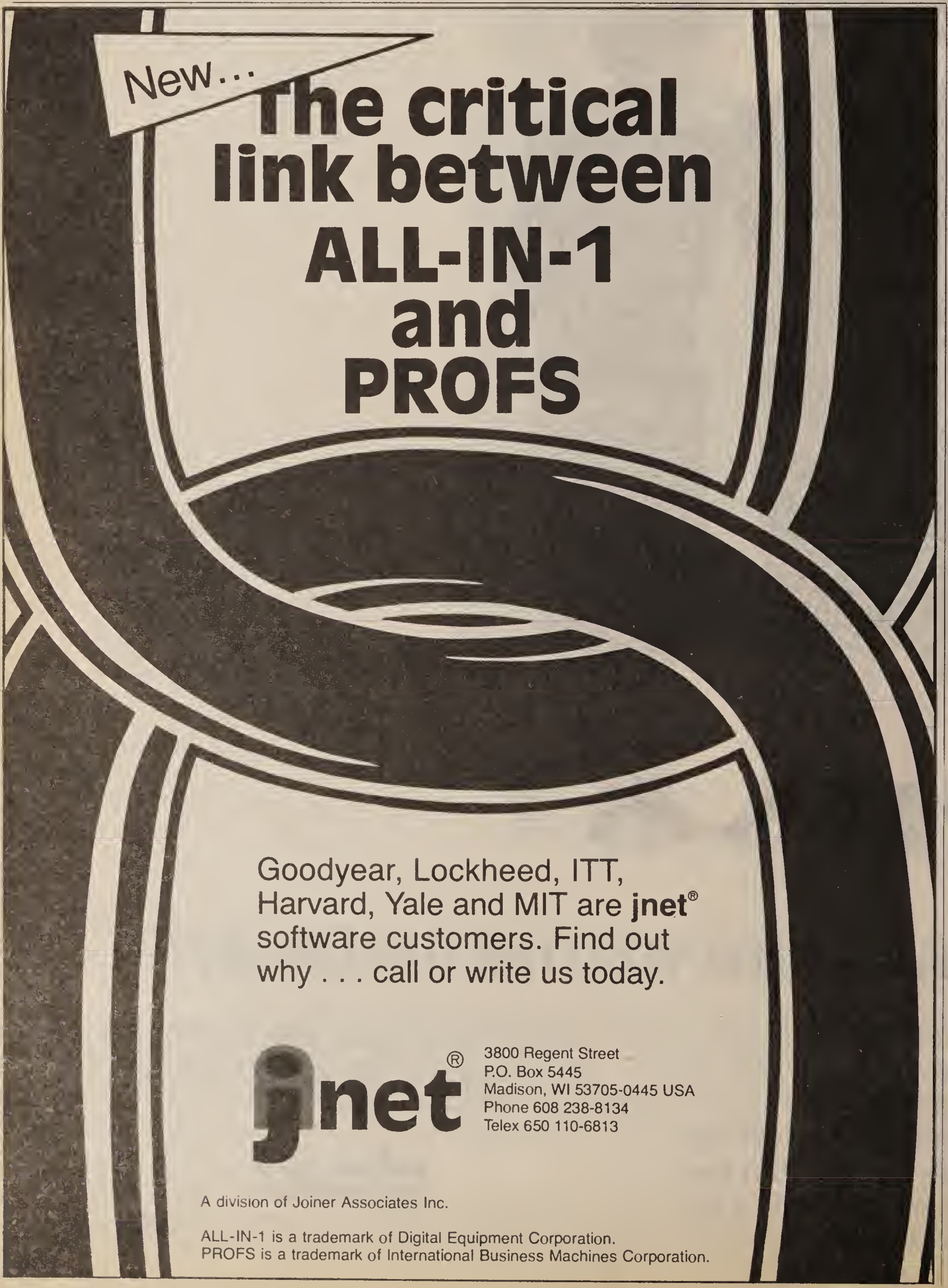
But if the profiles of the Personal Computer users range from computer illiterate to computer tolerant, you would be better advised to link the users into a more forgiving office system of the DEC, DG or Wang variety rather than turn them loose on a Personal Computer local-area network.

These more mature minicomputer-based office systems give Personal Computer users the best of both worlds: the ability to access all popular Personal Computer applications and the ability to tie into a departmental system for group communications, file transfer and other services.

User direction. Most user organizations are delivering clear signals to their computer suppliers that they do not intend to use a single vendor for their office/information processing needs — and the vendors are listening.

Users are becoming increasingly aggressive in setting their own standards and making their expectations known. In the manufacturing world, General Motors Corp.'s Manufacturing Automation Protocol (MAP) exemplifies a user-driven standard with widespread vendor compliance. Boeing Computer Services Co. is pushing the Technical Office Protocol as the office equivalent to MAP.

Such efforts, if widely supported, may speed the day when multivendor integration becomes truly transparent to office computer users. ■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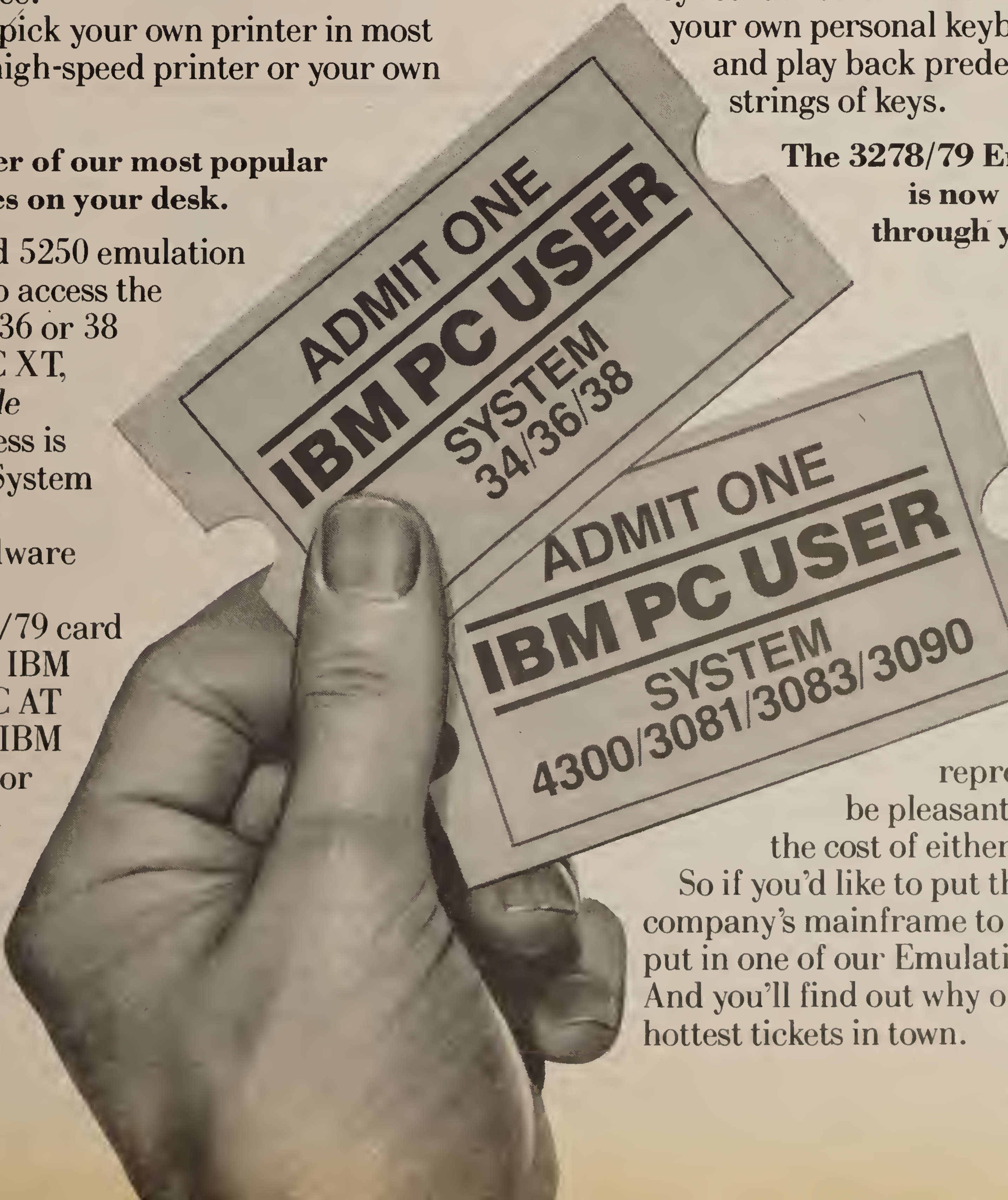

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solution, they are going to buy it."

Industry analysts say they believe most users actually want to interconnect electronic mail systems, such as DEC's All-In-One, DG's Comprehensive Electronic Office (CEO) and Wang Laboratories' Wang Office. "If you look at a multivendor environment, what users really want to do is not use Disoss for library services; they really want to connect their mail systems together, and they think Disoss will provide that for them, which it does not," says Andria Rossi of Rossi Consultants in Marblehead, Mass.

"For the office user, the most important thing is to communicate at a peer level with the host. That's where the user will first see the benefits. And the peer level that is most important on the OA side is the mail system. What users need is the ability to send files back and forth to one another, not necessarily to store them," Rossi says.

This need to hook into IBM in the office actually created an industry of its own. The bridge business is gaining attention and profitability. Forrester Research, Inc., a Cambridge, Mass. consulting firm, estimates that the bridge business will account for $136 million in sales this year and reach nearly $750 million by 1990.

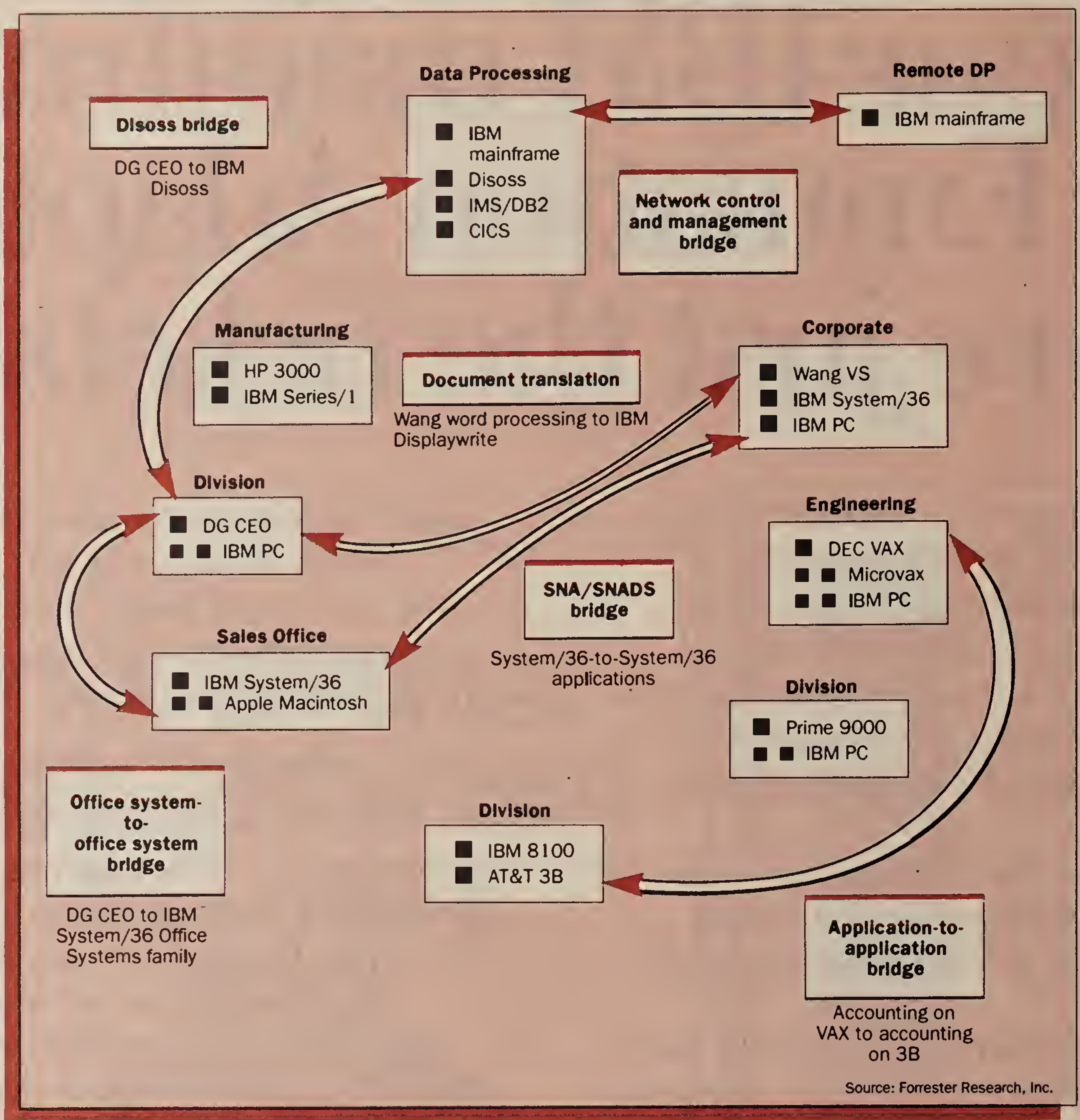
According to Forrester Research, the bridge business is divided into physical and logical bridges (see chart). Physical bridges, such as protocol converters and terminal emulation, move bits between two points. Logical bridges assist in the high-level interchange of data, for instance, between applications running on two incompatible computers.

This bridge business allows latecomers like AT&T a chance to enter the office game; enables minicomputer vendors like DEC, DG and Wang to sell into IBM-dominated companies; and creates opportunities for new third-party bridge vendors, Forrester Research points out.

As physical bridges become less important with the emergence of communications standards, the logical bridge business will thrive. High-level architectures such as SNA are moving targets and will continue to require upgraded bridges.

As the major vendors look for connections to IBM, many are following similar paths while others look to individual solutions. The following is a sampling of what is being done.

LOGICAL BRIDGE EXAMPLES



Source: Forrester Research, Inc.

MITCHELL J. HAYES

Logical bridges assist in the high-level interchange of data. The logical bridge business is expected to thrive as multivendor integration becomes a reality.

DEC

"DEC probably has the strongest departmental distributed processing product line going," the Yankee Group's Lowber says. "They offer strong SNA capabilities within the Decnet world, and with the DIA DCA revisable and final form capability that DEC offered last year, they are probably 12 months ahead of most of their competitors."

DEC's Digital Network Architecture (DNA) is based strongly on the ISO Open Systems Interconnect (OSI) standards, thus allowing DEC to offer compatibility with the two major emerging standards. Last April, DEC introduced Decnet-DOS, software that integrates the IBM Personal Computer into the Decnet network. Analysts say they believe that this product will significantly increase the number of IBM Personal Computers connected to DEC VAXs. Though DEC has not officially announced an IBM Personal Computer-compatible workstation, it is expected that such a machine will be introduced sometime this year.

According to David Korf, DEC's multivendor interconnect marketing manager, the company built its SNA gateway as a network-to-network link. Architecturally, this means that DEC does not provide any code that must be implemented on the IBM host, saving both time and money. "This means risk avoidance and investment protection to our customers and to us as well, because every time IBM releases a new version of their software and changes a comma, we don't become instantly incompatible," Korf explains.

As physical bridges become less important with the emergence of communications standards, the logical bridge business will thrive. High-level architectures such as SNA are moving targets and will continue to require upgraded bridges.

The Decnet/SNA gateway is a DEC PDP-11/24 running 1M byte of memory. It supports two lines of 56K bits each. According to Korf, DEC's SNA gateway products are truly bidirectional.

Among its products that are already shipping is DHCF, which allows an IBM 3270 terminal user working in an SNA environment to go through SNA across the Decnet SNA gateway and log on to a VAX. "That's really significant," Korf says. "Previously, the only capability was to go into emulation in the IBM environment. And no one could really initiate transactions from inside the IBM environment to external environments."

DEC is also the first major vendor to ship a Disoss interconnect. The company offers two products, External Document Exchange (EDE) Disoss and DDXF, to accomplish this. Based on the Advanced Program-to-Program Communications (APPC) and LU6.2 protocols, DDXF enables users of DEC's All-In-One office system to access both the distribution and library functions of Disoss. When DDXF was announced, it specified only final form document capability, but the EDE Disoss capability allows revisable form translation as well.

The significance of the LU6.2 connection is that it opens DEC's VMS operating environment to IBM's SNA. Applications for the VAX and Microvax systems can now communicate with IBM host applications peer to peer.

DEC, in fact, says it believes that its proprietary networks are superior to IBM's offerings. "Both SNA and DNA were announced in the same year," Korf says. "If you look at the capability each provides, there is really no comparison. People are talking about LU6.2, saying, 'Hey, this is great stuff.' DEC has been shipping products that allow two programs to communicate together as peers between machines for over five years now. That was the whole basis upon which Decnet was built. They call it a brave new world of LU6.2. We say, what brave new world? This is our backyard."

In the pursuit of local-area networks, DEC has long supported Ethernet. DEC has no plans to implement IBM's Token-Ring network product nor build any gateways to it.

"What IBM has done is create another island of PCs," Korf says. "They have nothing that ties those PCs to the department or the data center. We can do that already using Decnet and tying the PCs to a departmental Microvax."

According to research firm International Data Corp. in Framingham, Mass., DEC plans to introduce added features into the SNA/Gateway in the near future. A possible product would involve the integration of All-In-One with the SNA/Gateway.

Data General

"DG is a pretty formidable competitor in the office," the Yankee Group's Lowber says. The Westboro, Mass.-based firm claims to be the first minicomputer maker to support SNA; DG began its support in 1981.

According to Joe Forgione, manager of communications products for DG, the company is committed to connecting to IBM to the fullest possible extent, not only with physical links but with architectural links as well.

DG has fully connected the IBM Personal Computer into its CEO environment allowing access to all CEO applications.

Though it stated its intent to hook to Disoss via LU6.2, DG has yet to ship its product. It is scheduled to go to market sometime this year. Forgione points out, however, that DG has shipped phase one of its DXA product, which allows the exchange of fully revisable documents with the SNA environment. DG's network architecture, Xodiac, is based on the X.25 protocol, and like DEC, DG's focus is on peer-to-peer communications. It includes links between MV

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Finally, IBM pulls together a cohesive office systems strategy

By ALEXANDER NEDZEL

As office systems proliferate, today's MIS managers are becoming increasingly fluent with such terms as Distributed Office Support System (Disoss), Document Interchange Architecture (DIA) and Document Content Architecture (DCA), Systems Network Architecture Distribution Services (SNADS), Professional Office System (Profs) and System/36 — IBM words.

The cornerstone of the IBM office systems strategy lies not in hardware or software but in standards authored by IBM. For example, Systems Network Architecture (SNA) describes underlying system network protocols and services. DCA governs the internal structure of documents. DIA describes the exchange of documents.

Through these standards, IBM is moving to achieve a balance between two objectives. The first is to make the stakes high for competing hardware vendors that want the ability to connect their equipment to an IBM environment. They must spend research and development time and money to stay up to date with and support IBM standards.

IBM's second objective is to enhance the functionality of its office systems as quickly as possible. By making its standards reasonably open, IBM encourages the development of third-party software. This strategy thus saves IBM valuable time in its quest for competitive office systems in much the same fashion that an open architecture helped bring the Personal Computer to a position of market primacy.

Product offerings

IBM offers office systems for a number of its computers, notably the 370 (MVS and VM operating systems), System/36, the Personal Computer, the 5520, the 8100 and the System/38. Originally, the various products lacked compatibility. IBM has worked hard to increase the capability to exchange information among systems, principally through Disoss.

Running under CICS on a mainframe, Disoss supports the central storage and interchange of documents among hooked-in systems, using DIA and DCA as the common denominator.

While continuing to support all of its systems, IBM is concentrating on the 370, System/36 and Personal Computer as its strategic offerings at

Continued on page 52

Nedzel is a managing associate with the Advanced Technology Group of Index Systems, Inc., a Cambridge, Mass.-based consulting firm.

Interview

Bankers Trust explores options in multivendor integration

Bankers Trust Co. in New York is one of the nation's 10 largest financial institutions. Despite its size and the fact that banks have generally been on the leading edge of computing technology, Bankers Trust is only now exploring the interconnection of equipment from its two major vendors: Digital Equipment Corp. and IBM.

IBM dominates the host and personal computer levels in the bank. Running several IBM 3084s, 3083s and 3033s, the bank has both MVS and VM operating systems in place. At the desktop level, there is a split between dumb terminals and personal computers. Of the 1,500 microcomputers in use, 1,300 are IBM Personal Computers; the remainder are DEC Rainbows and a smattering of other machines.

Running in the middle levels are several interbank networks, including the bank's own private X.25 network called BTnet, that hook into various departmental systems.

The bank's Office Information System (OIS) project, under the direction of Louis Galterio, vice-president in the bank's technology department, runs on DEC's All-In-One office package. According to Galterio, Bankers Trust is embarking on a project to connect the OIS system to the bank's host computers. Currently, it is looking for a plan that would satisfy its needs without locking the bank into a technological corner in years to come.

Computerworld *Senior Editor Glenn Rifkin spoke to Galterio about Bankers Trust's multivendor dilemma and the bank's plans to solve it.*

Have you set up a strategy to create bridges to IBM in the office?

It is in the discussion stages now. We know we want to do it, and we've had some ideas. We are not at the point of getting an actual plan out on exactly what we want to do. We were originally going to do it in the most inexpensive way possible.

The target audience is a group of programmers, people who have IBM 3278-type terminals hooked by coaxial to a mainframe application. It doesn't make sense to give them a DEC VT100 just so they can send mail to their users. Their users happen to be around the world on the OIS system, and it happens to be DEC-based right now. So we say there are a lot of programmers out there who have to talk with their users, and they can't unless we spend money and buy them extra terminals.

We decided to do a small pilot using Jnet from Joiner Associates, Inc.

Louis Galterio

'What I hear from my contacts is, "No, no, no. We are not ready for Disoss. We don't think it's as good as VM."'

What does Jnet do?

Jnet runs the software that runs on a VAX. What happens on the IBM side is the user in the VM world will send a note, a VM note. The VAX is defined to the VM machine as a remote spooling communications subsystem RSCS node. The mail thinks it is going to another VM host, another spooling device, but in reality, it is going over a line into a VAX machine, and Jnet takes the message and then converts it into something called Vaxmail. Then users on the VAX machine would get the mail as if they got it from another VAX user.

All of that sounds nice, but there is one big sticking point. We don't use Vaxmail as the interface for the user community. We use All-In-One. The big trick is how do we get the Vaxmail to the All-In-One? Right now, there is no clear answer. Other alternatives are things like Soft-Switch [a communications product from Soft-Switch, Inc.] The problem with that is that it is too expensive, and it also interfaces with IBM's Distributed Office Support System.

You don't have Disoss in yet?

We don't have Disoss.

Any plans to go that way?

Possibly. That is the call that I have to make. We're looking at that.

If the Jnet pilot is successful, what next?

We would run a pilot for six months and then reevaluate the technology. At that point, we would decide whether we should continue with a VM Note facility or use an IBM Professional Office System interface, or whether we should maybe change to Disoss or somehow support both and upgrade the equipment and the software to do that.

Since DEC has made the commitment to Disoss, does that seem like the right direction in which to go?

From what I read in the press, Disoss seems to be the way to go. Yet, on the other hand, I meet a lot of people, and I have a lot of contacts out there, and of everybody who has anything to say about IBM office automation and what path they are taking, most of them are looking at the VM route.

It's kind of funny. IBM looks like it is committed to Disoss, and that is going to be their offering. Yet what I hear from my contacts who are doing this is, 'No, no, no. We are not ready for Disoss. We don't think it is as good as the VM route, and we are going to go VM.' That has put me in a dilemma, too. I don't know whether I should make plans to support both or what.

What does DEC say to you about this?

From DEC's perspective, I think they are looking at it the same way I am. They are looking at what the press says and what they hear from IBM statements of direction. They are doing a lot of things, like the Systems Network Architecture gateway product, LU6.2. And I wonder now if maybe there is not that much of an audience to take advantage of those products. There are a lot of unanswered questions.

What advice would you give to fellow MIS managers looking at this same question of integrating multiple vendors?

I would try to find people who are doing it and try to set up relationships with people who have IBM shops and are trying to put office automation in. I would talk to these people and to IBM. I wouldn't just listen to the vendor. I'm finding in my small circle that it is not exactly what I am reading in the press. I may be talking to all the exceptions, but I doubt it. My advice would be to talk to people who are struggling with it. Don't just go forward with what you read.

Do you feel that the users are really banging down the door for connections to IBM, or is it really driven by MIS people?

It is driven by the MIS people. Most of my users are bankers. They are not technical people, and they really could care less how it is implemented as long as it helps them get their job done. ■

Continued from page 50

systems and file transfer between DG's Desktop Generation and MV systems.

Forgione points out that DG is seeking to distribute more functionality to the Personal Computer within the MV world. DG also plans to unveil its connection to SNADS by the middle of this year. Though DG, like others, questions the value of Disoss, it is committed to transparently connecting CEO to Disoss. "Our customers are asking about it, and it's appearing on every major request for proposal," Forgione says. "Whether they are using it or are simply concerned about a long-term commitment, I don't know."

DG is committed to the ISO standard as well. Forgione says he believes that between the ISO and IBM, all proprietary networks will migrate in that direction in five years. DG has no plans to hook to Profs despite the surprising increase in popularity of that product recently. Forgione says that IBM indicated a link between Disoss and Profs was on the way and DG would interface to Profs through that link.

> ***'Ultimately, we will be compatible with IBM all the way to the application level. But right now, there is no timetable or plan.'***
>
> **— Joe Forgione**
> **Data General Corp.**

DG, like DEC, makes no commitment to IBM's Token-Ring local-area network. Eventually, DG believes that standards will straighten out the current confusion. A vendor may retain proprietary subnetworks as long as there are open gateways to the outside world. "Ultimately, we will be compatible with IBM all the way to the application level," Forgione says. "But right now, there is no timetable or plan."

Wang Laboratories

As a major office vendor, Wang faces critical tests in the next year.

The Lowell, Mass.-based computer manufacturer has clearly exhausted its ability to survive as a word processing vendor. A bad fiscal year in 1985 set off a chain of negative press and a slip in credibility. Among the high priority needs for Wang is to provide solid hookups to IBM. It is a concern that has not been ignored, but analysts have already questioned Wang's bridges and their implementation.

Wang's framework and

Continued on page 54

Continued from page 51

the mainframe, departmental/work group and workstation levels, respectively. On each of these key systems, two major types of office software are available: Displaywrite for word processing and Personal Services for exchanging documents, currently via Disoss.

IBM's position is currently encumbered by a number of weaknesses. First and foremost, the System/36 is seriously underpowered for its intended departmental computing role. Although the System/36 architecture allows for expansion on the high end of the performance scale, IBM has been slow to allow the system to grow, probably to avoid cannibalizing the System/38 product line in its principal market — small corporations.

Today, expansion of the System/36 line is appropriate for IBM, and over the next year, the firm will likely announce high-end models that will provide at least a threefold increase in power. However, as mixed documents — using, for example, combined text, image, graphics and voice — become more prevalent during the next few years, the 16-bit System/36 will probably not be able to keep up with the steep increase in departmental processing demand.

IBM's easiest course of action then will likely be to assign the departmental computing role to the low end of the 370 line, which by then should be running an SNA-compatible, easy-to-operate descendant of today's VM operating system.

Second, document interchange now occurs primarily via Disoss, running on a centralized host system. In many situations, it would be much more efficient to exchange documents between departmental processors without having to go

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through a central host. This route will soon be possible using SNADS, electronic mail support software that takes advantage of the LU6.2 and PU2.1 SNA protocols.

As the volume of peer-to-peer traffic among departmental processors increases within user organizations, IBM surely will extend the coverage of its Token-Ring local-area network to include these systems, thereby making available a very high-speed connection. The local network is now essentially restricted to microcomputers.

Third, because of dissimilar word processing software, 370 users operating under VM cannot exchange revisable documents with the Disoss world. This inability is significant because Profs, IBM's office package for VM systems, provides reasonably rich office support for the VM user community. It also retains a strong following. Fortunately, IBM will eliminate the problem within the next year by making Displaywrite/370 available within Profs.

Charting a course

At the mainframe level, the Disoss and Profs environments allow users to create and exchange documents. Disoss also provides an infrastructure for the exchange of Personal Computer and departmental processor documents. Because of the importance of IBM's standards, the integration extends to the hardware of a growing list of other vendors. Where significant incompatibilities remain, third parties are likely to provide the necessary augmentation. In short, Disoss is a fairly low-risk vehicle for organizationwide document interchange.

At the Personal Computer level, IBM is not asking the MIS manager to make any difficult choices — the IBM Personal Computer is an excellent OA workstation by today's standards and integrates well with several competitors' office systems. Although Displaywrite 3 (the Personal Computer version of Displaywrite) is not among the world's finest word processing packages, it is adequate for most needs.

In addition, various software is available — and more is on the way — to convert the documents of some of today's most popular Personal Computer word processors to DCA format, allowing users of these packages to participate fully in the IBM office environment.

At the departmental level, the situation is less clear cut. At least one competing product line — from Digital Equipment Corp. — offers high-end performance and Disoss compatibility largely superior to the present System/36 offerings, and the viability of the System/36 as a long-term element of the IBM office solution is less than certain. Many users are postponing heavy investment in the middle tier until the IBM alternative is more defined.

This user strategy, which tends to emphasize Personal Computers and the mainframe, would cause difficulty for an organization in which large departments are not located near a mainframe and where individual usage levels cannot justify the acquisition of many Personal Computers.

To deal effectively with such a situation, a comprehensive technology plan is needed, which requires the following activities:

- Determining the types and levels of service required by each group of users over time.
- Identifying those users who must communicate electronically with which other users, in the near term and over time.
- Examining the technology currently in place and understanding how users' needs are being supported.
- Developing and understanding the various technology alternatives.
- Evaluating those alternatives to determine which will fit best with the operative priorities and values of the organization.

The technology plan must be specific and should address needs over several years. To maximize the benefit and utility of the plan, the MIS manager should take two final precautions:

- First, make certain that the effort is concerted enough to produce conclusive results within a usable time frame, usually no more than three months.
- Second, ensure that the requirements analysis is realistic. "Any-to-any connectivity" and "100% penetration" are exciting concepts but are rarely near-term necessities. ■

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CONNECTING TO IBM: A SAMPLING OF OFFICE VENDORS (AS OF JAN. 1)

	Digital Equipment Corp.	Data General Corp.	Hewlett-Packard Co.	Wang Laboratories, Inc.
LU6.2:				
At CPU	S	S	I	I
Via Gateway	S	—	—	—
Foreign Software on Host **(API Interface)**	No	No	No	Yes
DCA:				
Revisable Form	S	S	I	A
Final Form	S	S	I	A
DIA:				
Library Services	S	I	I	I[1]
Document Distribution	S[2]	S	I	I
SNADS[3]	I	I	I	I
Profs	I	—	S	S

S: Shipping I: Intention A: Announced

[1] Available in first-quarter 1986.
[2] DEC is shipping only final form with intent for revisable form.
[3] All four vendors are believed to be preparing SNADS connection.

Key:
API — *Application Program Interface*
DCA — *Document Content Architecture*
DIA — *Document Interchange Architecture*
SNADS — *Systems Network Architecture Distribution System*
Profs — *Professional Office System*

Source: International Data Corp.

DEC has the early lead, but others are in hot pursuit of IBM connections.

Continued from page 52

architecture for data communications is Wang Systems Network (WSN). The company plans to evolve WSN to an open architecture based on ISO standards. Under WSN sits the Information Distribution System (IDS), which is a software product that connects Wang systems together through the SNA network.

IDS is viewed as the communications transport mechanism between Wang's VS systems and the IBM host. IDS adds a layer of software on both the VS systems and the IBM host through IBM's Application Program Interface (API). It is through this addition of code on the host that Wang has implemented its Wang Office/Disoss Gateway, scheduled to ship in March, and it has received criticism for choosing that route to Disoss rather than LU6.2.

Consultants and users fear that adding code to the host is both difficult and costly and leaves Wang open to problems with SNA's ever-evolving environment. One observer calls the API route "a technical kiss of death," because it is a buffer with no data checks and no recovery capability. According to a Gartner Group report, Wang's Disoss product also lacks distribution capabilities, which is the main function users desire.

According to Ed Francis, Wang's manager of network systems products, Wang sees IDS as a plus, a capability other vendors do not have. Customers, he says, are actually asking for the capabilities of IDS along with a bridge to Disoss.

Francis is quick to point out that Wang is currently working on a Disoss interface using LU6.2 as well. He would not give specific dates but promised the new product would be announced and shipped this year. Wang is not simply responding to its critics by turning to LU6.2, Francis insists. There are customers who want it. He says he firmly believes, however, that the IDS implementation is superior and offers a less restrictive environment for interconnection to IBM.

Unlike DEC and DG, Wang has already made a commitment to a Profs connection. Similar in function to the Disoss gateway, the Profs gateway allows Wang Office users to exchange editable documents with the Profs library. Unlike the Disoss gateway, the Profs connection does not use IDS but rather an IBM 3270 connection to move the document from the Wang system to IBM.

Though Wang has made no formal announcement on a SNADS connection, Francis advises customers to keep their ears open; an announcement is forthcoming.

Wang also claims the ability to connect to IBM's DCA at the Wang Office/Disoss gateway, but it is actively pushing its own document content architecture, Wang Information Transfer Architecture, as a standard.

Another question Wang must address is connectivity to IBM workstations. Last July, Wang opened the VS minicomputer environment to IBM Personal Computer users with three new products: Wang word processing on the Personal Computer, Wang Local Office Connection and Remote Office Connection. But according to the Gartner Group, Wang does not yet support any IBM workstations other than the Personal Computer, leaving a large installed base of IBM terminals that Wang cannot reach with its systems.

Nonetheless, Wang is clearly committed to opening its environment and meeting coming standards. Francis is convinced that in five years, when both IBM and international standards are in place, the customer will have to evaluate only which systems are easy to install and use. "Connectivity will simply become a commodity item," he says.

Hewlett-Packard

For HP, 1986 is going to be a big year in terms of interconnecting to IBM. Admittedly late with products in this area, HP decided that a rush into these murky waters would be unwise. "There is no argument that we have taken our time on this," says Martin Lambert, HP's North American business development manager. "It wasn't clear to us what the best route to hook into Disoss was. If a company is basically going to put their corporate survival on the Disoss line, we were not going to rush out a product line just to fit in that groove."

> ***'It wasn't clear to us what the best route to hook into Disoss was. . . . We were not going to rush out a product line just to fit in that groove.'***
>
> — Martin Lambert
> Hewlett-Packard Co.

HP's strategy was to approach IBM from the Personal Computer end rather than from the mainframe side. The HPmessage product, unveiled in November 1984, offered IBM Personal Computer connectability on the work-group level and allowed a user interface to the minicomputer level of office functionality. HP won no honors with this product, as it required HP proprietary code on the Personal Computer and required applications to run through the host.

On Jan. 1 of this year, HP began shipping the second release of HPmessage, which makes use of the company's new Advancewrite word processing software and its new Personal Computer-compatible desktop called HP Vectra. The second release automatically converts IBM Displaywrite 3 to Advancewrite formats.

In addition, HP began shipping its minicomputer-based DCA converter product along with HP Officeconnect/Profs. The Profs connection is an HP 3000-based package that connects the HPdesk electronic mail system to Profs.

According to Lambert, HP will announce HP Officeconnect/Disoss in May and ship the product this summer. The Disoss connection, like those from DEC and DG, is based on LU6.2 and will allow HP 3000 users access to DCA revisable form text support for Disoss distribution facilities, document management and library function facilities. HP, like

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                                           QUOTA       SALES         %
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               Executive Furnishings       $ 800.00    $1650.54    206.31
               Specialty Furnishings       $ 500.00    $ 851.00    170.20
               Upholstered Office Furn     $1000.00    $ 932.20     93.22
        TOTAL  FOR PATRICIA JACKSON        $2300.00    $3433.74    149.29

        85     JOHN BRIGHT
               Specialty Furnishings       $ 500.00    $1251.00    250.20
               Georgian Home Line          $1500.00    $2532.20    168.81
               Executive Furnishings       $ 800.00    $1216.36    152.04
               Upholstered Office Furn     $1000.00    $ 916.20     91.62
               Colonial Home Line          $1500.00    $    0.00     0.00
        TOTAL  FOR JOHN BRIGHT             $5300.00    $5915.76    111.61
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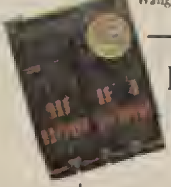

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DEC, has also turned toward a physical link, PU2, which provides a host and slave hierarchy and supports what Lambert calls "the three-tier corporate information strategy."

This strategy consists of a host, departmental and personal computer levels of computing — a direction the minicomputer makers are pushing.

Lambert says that HP came out with its Profs connection first because its marketing data showed a faster ramp up of Profs users than Disoss sites.

He calls Disoss "a big beast," and implementation has not gone as quickly as some had anticipated. "That worked in our favor," he says.

Consultants praise HP's open architecture and strong customer support but worry about its slow approach. It has a less than comprehensive range of SNA links, and its 3000 minicomputer has reached its performance limit.

According to the Yankee Group's Lowber, HP's new Spectrum system, which was designed to replace the 3000, will not be delivered until 1987.

"If the Spectrum flies, they'll be OK, but if it crashes, they are in real trouble," according to Lowber. "There's currently a lot of uncertainty because they are so uncompetitive right now with something like the VAX 8600 or 8650."

AT&T

Like the new kid on the block, AT&T must prove it belongs. Since its divestiture, the communications giant has been pointed at as IBM's only true competition. Yet AT&T has yet to prove itself in the MIS world. As an office vendor, AT&T flooded the market with various computer and communications products, but it still must prove its ability to connect to IBM in order to thrive in this market.

A late entry hurts. AT&T announced a spate of SNA connections for its 3B line of computers last summer. While that announcement indicates the proper thinking, analysts say AT&T still has a long way to go. George Martin, director of computer marketing for AT&T, insists that his company is committed to protecting the investments of its customers so users do not have to change what they have.

According to Martin, AT&T links to Disoss using LU6.2 and PU2 on its Unix-based 3B1 system and the Unix PC 6300 are in beta test sites right now. AT&T is also working on DCA and DIA connections, and Martin says that all of this functionality will be available this year. Realizing that it must get into the fray quickly, AT&T has sought out third-party software developers like Soft-Switch and Orion Software, Inc. to produce the links for it.

Martin stresses that the Unix environment gives AT&T an advantage in that it is an open environment that allows for multidimensional computing.

He also points out that AT&T's communications strength is a bonus in networking using the new Starlan local-area network to hook together IBM Personal Computers. That capability is not yet available but has been made a statement of direction.

Whether or not AT&T can achieve a fully robust connection to IBM in the office quickly enough to satisfy potential customers remains to be seen. As Martin points out, the sales force must change the mind-set of the customer. "We have to get them to remember the transparency we brought to the phone environment," he says. "They trusted us with their data off premises. Now we want them to take that trust internally."

Soft-Switch

While the large hardware vendors are scrambling to produce their own IBM connections, third-party software developers such as Software Research Corp. of Natick, Mass., Pathway Design, Inc. of Wellesley, Mass., and Communications

> ”
>
> ***Realizing that it must get into the fray quickly, AT&T has sought out third-party software developers to produce its IBM links.***

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Solutions, Inc. of San Jose, Calif., have succeeded in targeting bridge products at multivendor environments on an OEM basis. The most successful of these vendors is Soft-Switch of King of Prussia, Pa.

Founded by Michael Zisman in 1979 as an independent consulting firm, Soft-Switch created a sought-after document interchange package that enticed both customers and vendors looking for a connection to IBM. According to Zisman, the company grew 100% in a single year, and revenue is up to $10 million. Soft-Switch made OEM agreements with such vendors as Wang, Tandem Corp. and AT&T and is installed in more than 50 user sites.

Zisman says that the benefit of his product is that it provides a single-vendor solution to the multivendor problem. "You can go out and buy a DEC connection or Wang connection to Disoss, a bridge from Profs to DEC, but anytime you bring together equipment from multiple vendors, there's a system integration function to be performed," he says. Because Soft-Switch takes responsibility for tying together multivendor environments, the user knows exactly who to call if the system fails.

Soft-Switch gives users in multivendor sites the ability to send and receive revisable form documents to otherwise incompatible systems. It is a software product that runs as a CICS application on the IBM host and performs three basic document interchange functions: translation services, distribution services and library services. Among the office systems it supports are Wang's VS, Office Information System and Alliance; IBM's Personal Computer, Displaywriter, 5520, Displaywrite 2 and 3, Disoss and Profs; DEC's All-In-One, Decmail and VMSmail; Xerox Corp.'s 850 and 860; and NBI's Oasys 8 and 64, 3000 and 4000.

Critics claim that Soft-Switch-type solutions are Band-Aids, offer lower functionality, are difficult to implement and simply add another vendor to the multivendor stew. Zisman disputes these claims. Cost is irrelevant, he claims, when compared with the problem it solves. "People have million-dollar systems out there in islands of connectivity. They don't care, within limits, what the software costs to tie it together. If you've got a $40,000 Porsche, are you really going to care whether the air filter costs $40 or $20?"

Zisman also says that Soft-Switch offers more fidelity in translation than other systems, and the bridges are more transparent. Aware that other vendors are working hard at creating their own bridges, Zisman is undaunted. "Sooner or later, we all do everything. Other vendors are a generation behind us," he says. Zisman says he believes that eventually the translation business may become obsolete.

According to Zisman, what is evolving from IBM is a network operating system with LU6.2, and that means the user will have programs that provide services to other users, and those servers will exist in various places in the network. The servers will be built as VTAM applications that use LU6.2. Soft-Switch currently has placed in beta test its next release, which is a VTAM application with a complete implementation of LU6.2 and a complete implementation of SNADS on top of it. "That, to my knowledge, is the only implementation of SNADS anywhere," Zisman says.

Zisman expects this product to serve as the basis for a whole set of server products. Beyond the print servers, file servers and communications servers on the network, there is a whole set of resources on the host that need to be managed with a similar technology. "We think we are strategically well positioned to provide that," he says.

Managing the change

Managing the change away from a proprietary environment may be the most critical task an MIS manager faces as the second half of the decade begins.

Linda O'Keeffe, associate director of office systems and industry services for Dataquest, Inc. says it succinctly: "Every time you establish a link for information, you establish a process that has its own velocity. If one guy is linked to the mainframe, it may accelerate the use of information by a geometric progression."

It is not enough for MIS to simply install systems and wish users well. Issues such as capacity planning and security leap out when users contemplate links to information networks.

"The technical questions are really trivial," O'Keeffe says. "Data communications are a headache, but the problems are solvable. The hard thing to deal with is the contention between the gunslingers who want things done and MIS, which needs to oversee it."

At Coca-Cola Co. in Atlanta, Bill Harris, director of information systems, is learning the difficulties of trying to tie into IBM in the office — and his environment is not even multivendor.

Harris initiated a pilot project with Disoss, a product causing problems in more than one shop. Coca-Cola plans to implement Disoss in the future but has been hard-pressed to find a successful Disoss implementation to copy. Harris points out that while Disoss is an attractive product conceptually, it is extremely complex and difficult to get up and running.

"I suspect that as the learning curve increases — not just by us but by other IBM customers — and refinements are made, it will be a reasonable alternative for office automation," Harris says. "But it will be evolutionary."

Harris is quick to point out that if Disoss does not meet his needs, he will look for alternatives. "Frankly,

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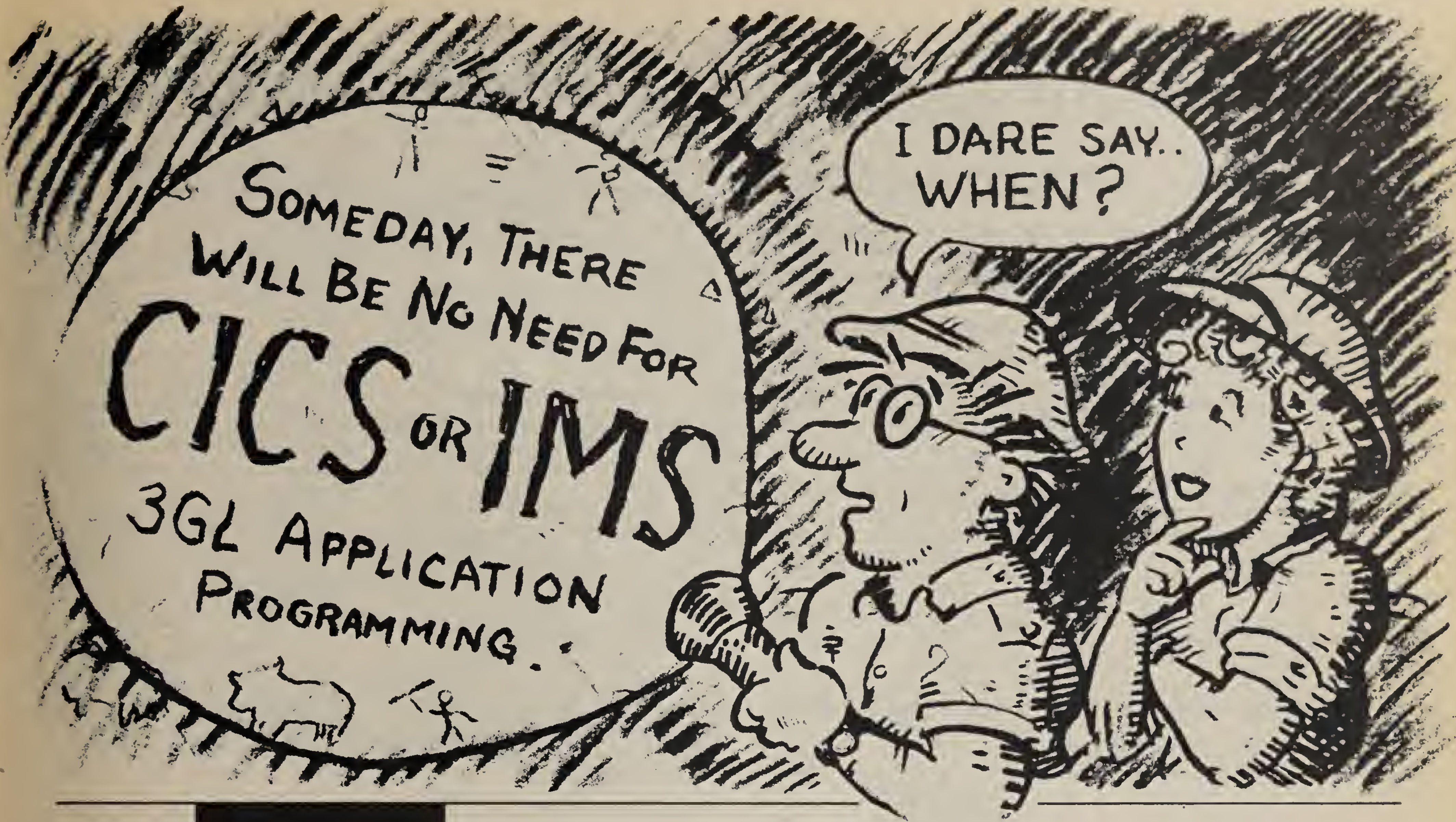
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Standards help bridge the multivendor communications gap

By LEE DOYLE

During the past two years, considerable attention, noise and confusion has been generated concerning the development of communications standards. Some industry experts proclaim that the era of standards will provide computer users with a plethora of benefits — seamlessly integrated networks, transparent document interchange and drastically lower communications costs.

Today, the installed base of computers and networks in most organizations is based on proprietary protocols from multiple vendors. Because IBM, Digital Equipment Corp., Data General Corp. and virtually every other major vendor has implemented different communications protocols optimized to their hardware, communications, involving sharing of networks, electronic mail and file transfer, is largely impossible in a multivendor environment.

Standards can provide the definition of interfaces so that two or more systems may communicate or work together.

Emerging standards

Communications standards are developed in three ways: via international committees, such as the International Standards Organization (ISO) and its Open Systems Interconnect (OSI) model; by a vendor through sheer market presence, as in the case of IBM's Systems Network Architecture (SNA); or by large users, as in General Motors Corp.'s Manufacturing Automation Protocol (MAP), Boeing Computer Services Co.'s Technical Office Protocol (TOP) and the U.S. Navy's Document Interchange Format. At this point, two standards dominate the market: IBM's SNA and variants of the ISO's OSI model.

SNA is a framework and design specification for all future IBM communications developments. It is, by far, the leading proprietary communications standard.

IBM claims that more than 21,000 IBM mainframes utilize SNA worldwide, and Framingham, Mass.-based market research firm International Data Corp. says it expects significant growth in SNA installations this year.

In the U.S., SNA dominates large organizations — only a handful of Fortune 500 companies have not installed SNA.

SNA as a standard

Although it is proprietary to IBM, SNA is a de facto communications standard. All major vendors, including AT&T, DEC, Honeywell, Inc., Sperry Corp., Burroughs Corp., DG, Hewlett-Packard Co., Wang Laboratories, Inc. and Harris Corp., support links between their own communications architectures and SNA. Most of these links are limited to IBM 3270 terminal emulation. However, several vendors, including DEC and DG, deliver advanced links that offer file transfer, electronic mail and developing peer-to-peer communications links between their networks and SNA.

LU6.2 is one of the eight logical unit types defined by SNA and designed to be IBM's universal protocol for connection of intelligent devices. IBM says that LU6.2 will be the focus for peer-to-peer communications within its office automation networks.

Over time, IBM plans to migrate all of its office products to LU6.2, which will allow currently incompatible products to communicate via SNA.

IBM products that implement LU6.2 include CICS, the IBM System/38 and 36, Displaywriter, Scanmaster and 5520. LU6.2 support for the Personal Computer family will be available in the second quarter of this year.

Document Content Architecture (DCA) and Document Interchange Architecture (DIA) are IBM's formal standards for distributing information within an office system based on SNA.

Simplified view

In a simplified manner, SNA can be viewed as the transport subsystem, while DIA defines the way information is exchanged, and DCA defines the format and structure of the information. IBM products that currently support DCA and DIA include the 5520, the System/36 and

Continued on page 65

Doyle is a research analyst in communications strategies for micros and office systems at International Data Corp., a market research firm in Framingham, Mass.

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the early returns are not positive; that's why we're wading into the pool and not leaping into it," he says.

In multivendor environments, the MIS manager must worry about each vendor's strategy along with the company's own data strategy. There can be no universal answer because there is no typical user organization.

"There is no such thing as a typical customer profile," O'Keeffe says. "Even though there are a handful of standards, all are implemented differently, and there are simply no roll-in-the-door solutions."

For MIS managers contemplating ways to oversee a multivendor environment, it is critical to be aware of the organizational impact of what they are attempting to do, according to Kevin Meagher, product manager for workstations at NBI in Boulder, Colo. It is also vital that the vendor understands the impact and is prepared to support its product.

"The MIS manager must support the applications that truly meet the needs of the user community and do it in a manner that is painless and transparent to the organization," Meagher says.

MIS managers in multivendor environments must worry about which vendor is accountable. Soft-Switch's Zisman outlines a scenario in which a company uses DEC, IBM and Wang equipment. "You can go out and get a DEC solution and a Wang solution, but I predict that you will take a document from a DEC system, and DEC will convert it to Disoss. Then you come along from the Wang side and pluck it out of Disoss and convert it to Wang, bring it up on your screen, and it looks like mush. The question is, Whom do you call?"

Users such as Kendall's McDonald do not hesitate to call whichever company is the main vendor in the shop. "We put it on IBM a lot here and give 'em heck," McDonald says. "We give them a lot money, and we expect them to come to the fore."

McDonald also strongly recommends seeking outside advice from consultants and technical seminars. "We got tremendous help from an outside consultant."

Consultants agree that MIS managers should keep a close eye on developments in multivendor integration and push hard with their vendors to get commitments and direction.

"This is the wrong time to rush off and build your own complex solution," consultant Hammer says, "because the vendors are working on it, and by the time you finish your in-house version, you can buy it for a tenth of the price. It's a good time to do what you absolutely have to do and not much more."

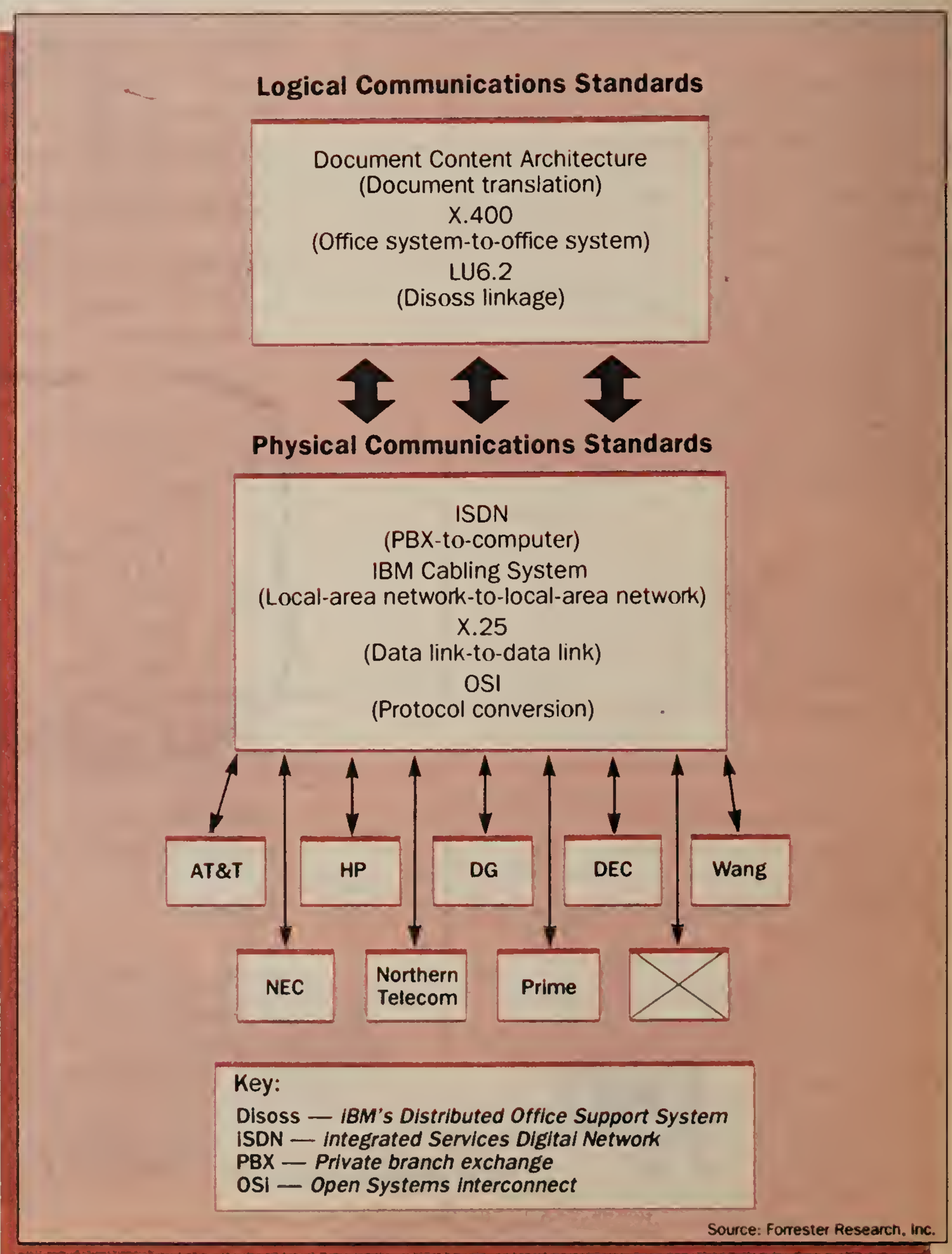
For those expecting a grace period after integrating their environments, the advice is to forget it.

"I don't foresee any calm," O'Keefe says. "We're always in the throes of how best to sort out the technology. You get to the next step, and pretty soon the step after that is staring you in the face. You're just going to have to juggle more balls." ■

> ***'This is the wrong time to rush off and build your own complex solution. It's a good time to do what you absolutely have to do and not much more.'***
>
> — Michael Hammer
> consultant

MITCHELL J. HAYES

NETWORK STANDARDS, CIRCA 1992, AND THE BRIDGES THEY REPLACE (IN PARENTHESES)


Logical Communications Standards
Document Content Architecture
(Document translation)
X.400
(Office system-to-office system)
LU6.2
(Disoss linkage)
Physical Communications Standards
ISDN
(PBX-to-computer)
IBM Cabling System
(Local-area network-to-local-area network)
X.25
(Data link-to-data link)
OSI
(Protocol conversion)
AT&T
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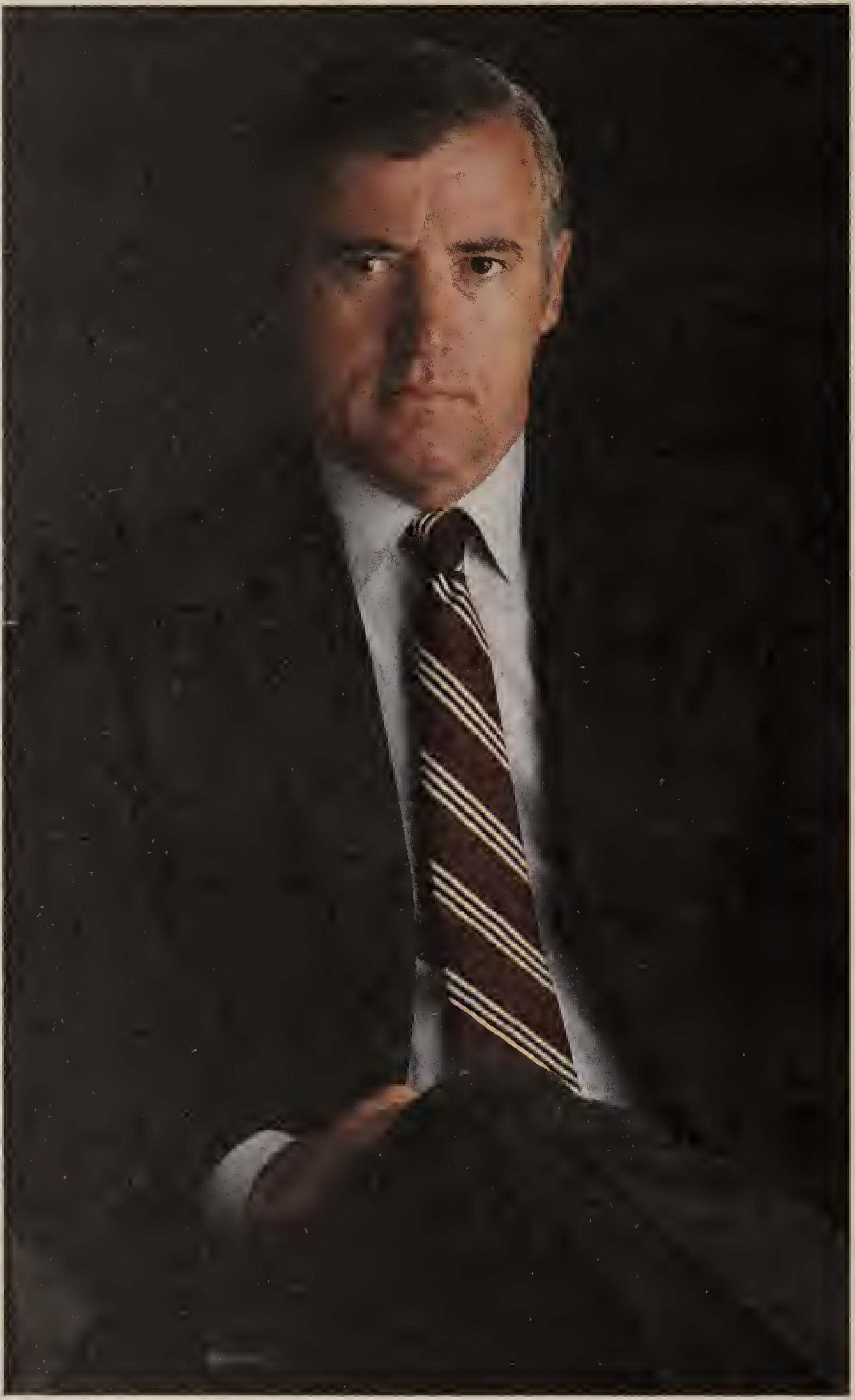
Prime
Key:
Disoss — IBM's Distributed Office Support System
ISDN — Integrated Services Digital Network
PBX — Private branch exchange
OSI — Open Systems Interconnect

Source: Forrester Research, Inc.

In the long term, many bridges will be co-opted by standards such as Integrated Services Digital Network, X.4 and LU6.2.

Straight talk about application software packages.

“Most application software packages are functionally rich. The problem is, that’s simply not enough.”



While everyone agrees that packaged applications possess great potential to save time and money, you’ll hear a lot of people—from MIS directors to operations managers—tell you the ones their companies have implemented fall somewhere short of satisfactory.

Typical limitations include the fact that the packages require such extensive modification that the savings they seemed to offer totally disappear. Another common complaint is that one application package fails to integrate with another. A third shortcoming, and perhaps the most common, is that packaged applications cannot be easily adapted to reflect the changing nature of the business.

You have only to look at the architecture of most of the applications currently in use to understand why these problems exist.

Many companies today depend on applications designed with technology from the 60’s and 70’s. Some are 2nd generation applications built without any reliance on database architecture. Others are 3rd generation applications that provide only a generalized *interface* to a database management system; in addition, many application vendors provide a common front end user interface to mask inefficient architecture. The result is that these 3rd generation applications realize only about 10% of the power of a DBMS. *And that’s simply not enough.*

Without full use of the facilities of a superior DBMS, users of application software find it extremely difficult to adapt and extend an application package to their current as well as to their future business needs. And *only* when an application is built with advanced database technology can it provide the sharing of data that leads to functional integration between different application modules.

Ultimately, what’s required is software that goes beyond the conventional packaged applications approach.

What’s required is 4th generation applications software—software that’s rich in functionality, and whose underlying architecture is built on, and takes full advantage of, advanced database technology.

Fourth generation application software is created using a comprehensive application development facility combining a fourth generation language and end user query and reporting facilities with an integrated data dictionary. Furthermore, fourth generation application packages are functionally integrated, sharing common data between independent modules. This creates an environment to easily adapt and extend an application package, and provides realtime access to all information.

Only fourth generation application software packages enable a company to realize the full potential of packaged applications.

It is clear, therefore, that all application packages of the future will be built using this technology… because it doesn’t make sense any other way.

J Cullinane

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2. Functionally Integrated

Businesses today demand applications to do more than address individual functions. Businesses today need applications that recognize the interdependencies within an organization—in short, applications that can share data. For example, efficient real-time, four-way matching of invoices with receiving, purchase and inspection documents can only be achieved through true sharing of data, and this sharing of data can only be achieved with an advanced database technology which delivers that integration. Redundancies are eliminated and productivity is increased when all applications dynamically reflect the operations of the organization. By sharing an architecture that provides for optimum use of an organization's information, Cullinet's manufacturing, financial, human resources and banking applications fulfill this need.

3. Easy to Tailor

Although many businesses appear on the surface to operate in a common fashion, each, in fact, is unique. Applications must therefore be built with an optimized set of tools that permits them to be adapted to a company's way of doing business, rather than having the company have to adapt to accommodate the software. Cullinet applications are designed to accommodate change. They provide the means to personalize screen layouts, capture new information, reformat reports, resequence transactions, and change messages without impacting the entire environment. Only Cullinet's applications can provide this environment for adaptability through their integration with advanced database technology. In this way, Cullinet applications give users the independence to adapt them—quickly and efficiently—to meet the unique requirements of the business.

4. Easy to Extend

As a business changes and grows, so do its needs and requirements. Cullinet provides easy to use, menu-driven facilities that permit functional extension of an application while preserving integration. An end user can quickly react to new requirements by prototyping an application functionally, developing new reports and performing ad hoc queries immediately. MIS can efficiently develop new, associated applications sharing common data and built utilizing the existing architecture. The Cullinet architecture segments the program logic, edit and validation criteria, as well as the security and recovery process, and therefore the complexity of creating new application functionality is significantly reduced.

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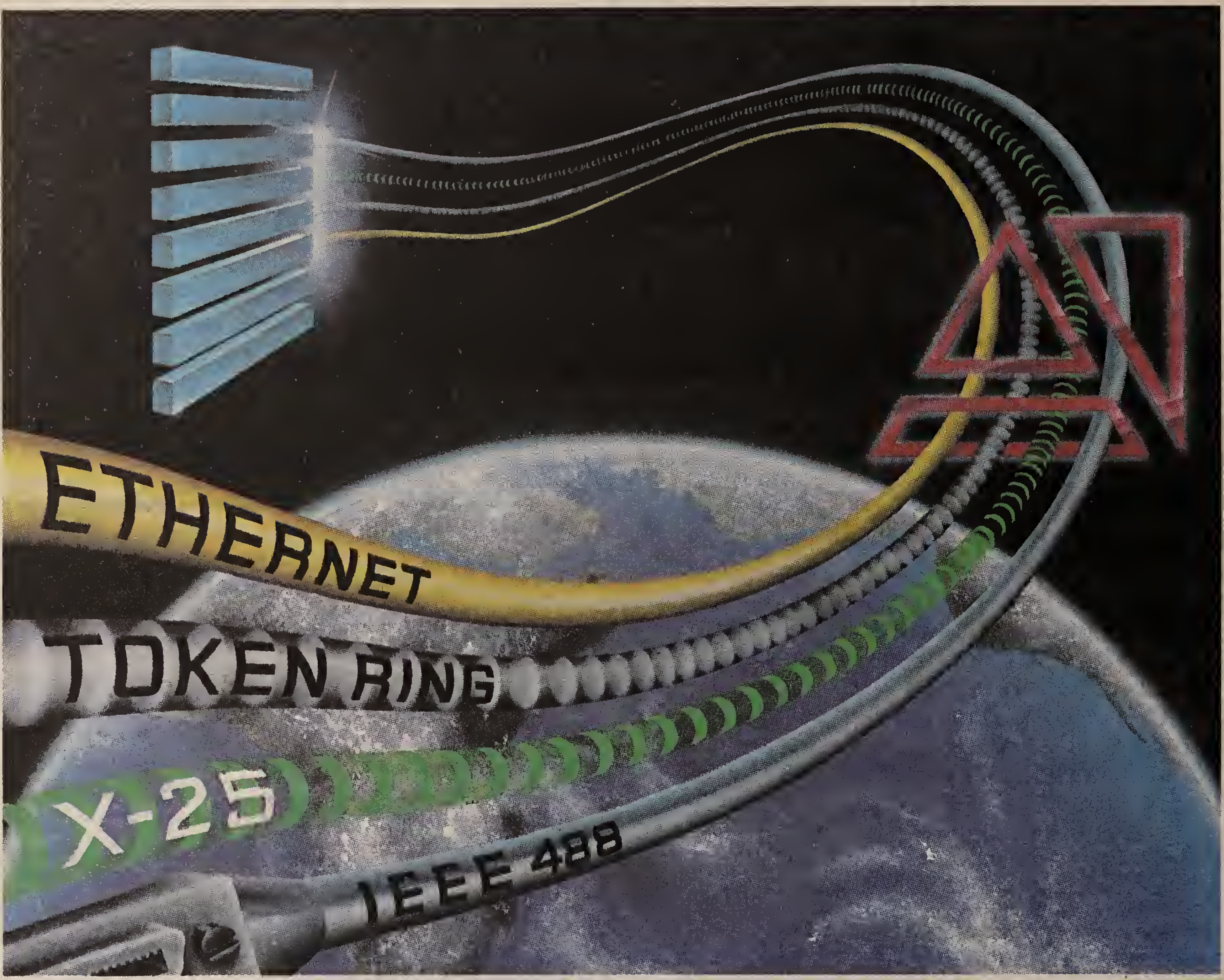

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Continued from page 60

38, Disoss/370 and the IBM Personal Computer family.

OSI protocols and standards organizations will have a large impact on multivendor integration. Two of the largest computer vendors in the world, IBM and DEC, have aleady made major commitments to OSI protocols. The influence of OSI will be subtle and indirect.

The creation of a reference model allows users to judge vendors on their compatibility and openness. The model profoundly affects vendors that would prefer to lock in their installed base with proprietary protocols but fear a backlash if they do not recognize user demands for interconnection.

Model for industry-specific nets

OSI also serves as an internally recognized model for industry-specific networks. Both MAP and TOP are based on the ISO model and incorporate many OSI protocols. MAP, backed by GM, Ford Motor Co. and other large manufacturers, clearly possesses the most momentum.

At the Autofact '85 Conference and Exposition, a MAP network consisting of more than 20 of the largest vendors was demonstrated. While the demonstration was a success, many glitches and malfunctions appeared, indicating that the building of multivendor networks will not be a painless experience.

Neither MAP nor TOP will serve as networking standards across all industries and network applications. However, they do illustrate how OSI protocols can be used to custom design multivendor networks.

OSI iimitations

Many OSI proponents bill OSI as the universal network that will make proprietary networks obsolete. In this case, all vendors would migrate from their existing architectures to OSI. This solution is simply not realistic during the 1980s for the following reasons:

- Many layers of OSI have just begun to be defined, including network control and management functions, document interchange and interface protocols. OSI is, at this point, merely a framework, not a fully specified set of protocols.
- A major limitation of standards is their static nature. New technological developments, such as increased performance or reliability, may supersede old standards, thus making OSI or any standard difficult to maintain.
- There is the myth of one standard. The protocol X.25, which only defines two layers of OSI, has been implemented more than 50 different ways. The development of local-area network standards is another good example.

Already, there are dozens of standards and proposed standards for local networks: the standard 802.3 at 10M bytes and the 802.3 at 1M byte; optimized broadband; cheapernet (a lower cost version of Ethernet); 802.5 at 4M bytes, 16M bytes and 80M bytes; and 802.4, just to name a few. It is impossible for a standards organization to develop standards that will meet universal needs.

- Users and vendors made huge investments in existing proprietary networks. Look for these networks and their successors to be around for quite some time.

Standards development will continue to make a large impact on network design and multivendor integration. However, implementation of standard OSI networks in large organizations is at least several years away.

> ”
>
> ***The creation of a reference model allows users to judge vendors on their compatibility and openness. The model profoundly affects vendors that would prefer to lock in their installed base with proprietary protocols but fear a backlash if they do not recognize user demands for interconnection.***

Migration problems unresolved

Vendors have not yet dealt with the problems of migrating their installed base and are not too eager to design networks to meet international standards.

Networks that are based on international standards will need extended shakedown periods — protocol inconsistencies, glitches and network management problems will be common.

Standardized networks like OSI, MAP, TOP and others will begin to penetrate the large installed base of proprietary networks, but this penetration will be slow as most organizations choose to stay with their existing proprietary networks.

The use of standards for connecting incompatible proprietary networks will have much more impact in the near term. Standards like X.400 will allow for electronic mail across multiple networks.

The proliferation of gateways to SNA, DCA and DIA will allow organizations to exchange documents through SNA. Standards will help user organizations; however, standardized networks are not a panacea. User organizations that do implement standard networks in the next few years will experience the frustration of being on the bleeding edge. ■

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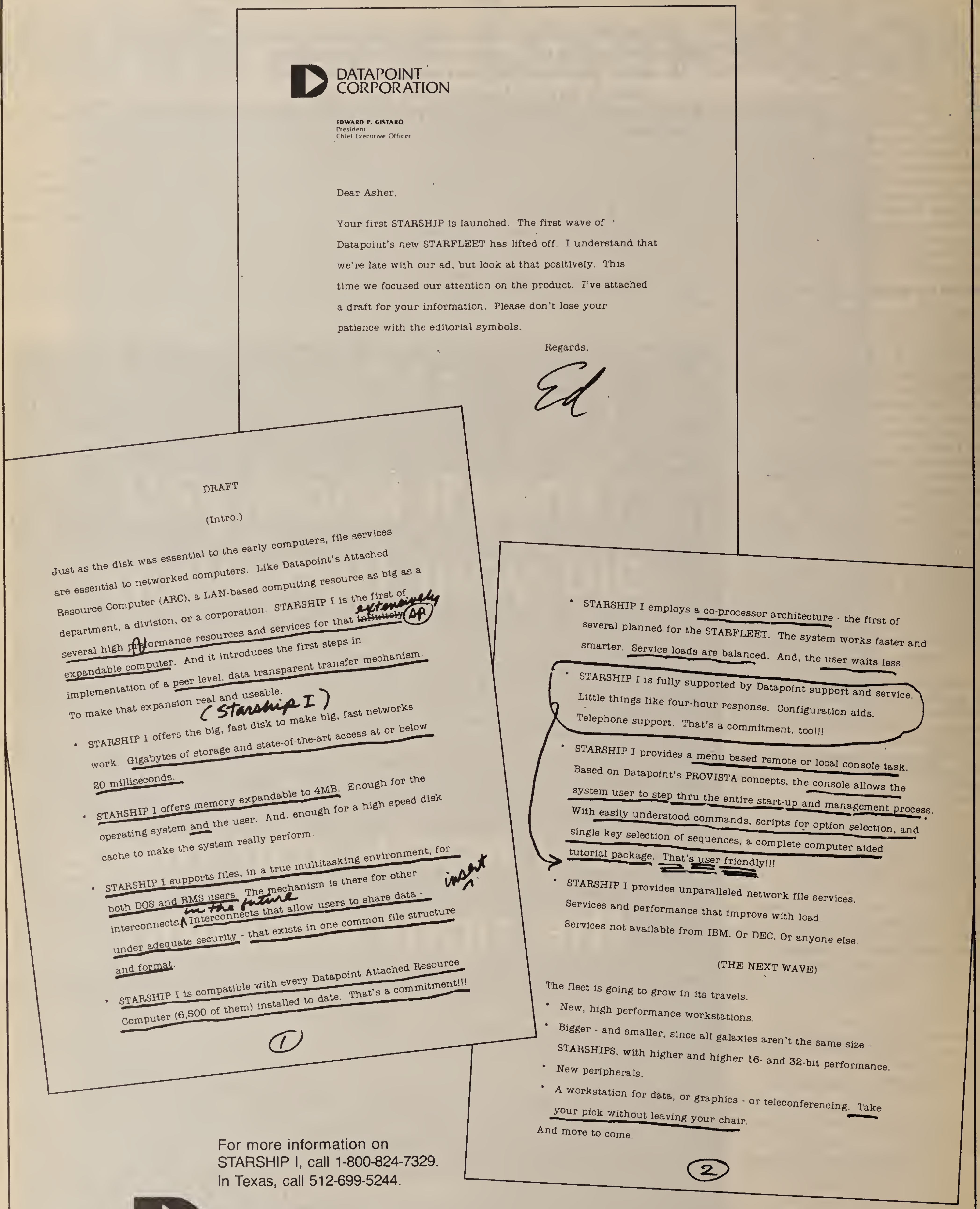

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IBM and AT&T slug it out over networks

By Leonard Kleinrock

CW PHOTO

While vendors formulate their strategies for universal networking, users are overrun by incompatible stopgap products. Most users really don't care who wins the "wire wars"; they want solutions and services they can access.

For more than a decade, the trade journals have promised us that the convergence of telecommunications and data processing was about to occur. At last it is here — and with a vengeance. We are suddenly being swept along in a rushing torrent of products, services, promises, horror stories and enthusiasm for the information age.

In this bright new era, end users are supposed to enjoy unlimited access to the information resources of the world — access that is immediate, friendly, of unlimited bandwidth, perfectly reliable, always available and free of charge. I call this concept "superaccess."

What we really envision is an enormous, integrated, distributed system. Superaccess means distributed processing, distributed communications, distributed storage, distributed data bases, distributed control, distributed management. . . . To consider designing such a system, or even to predict its performance, is to approach the foothills of an enormously complex problem and one that remains basically unsolvable.

Systems this complex do exist in nature, and they seem to function very well, but we do not know very much about them. For example, how many people know how the killer bees found their way to North America? What are the underlying mechanisms by which a flock of birds or a colony of ants accomplishes its group's goals? How do humans store and process information?

So too, we know very little about the large distributed systems we are about to construct. Yet we must address their complexity.

How close are we to this goal? What will be the implications of achieving this goal?

End users find themselves awash in unfamiliar products and conflicting claims when it comes to telecommunications. In the late 1970s, vendors peddled the magic of office automation. The users' mistake lay in believing the vendors when they promised it would be available immediately. When the magic failed to materialize, users blamed a lack of adequate communications to interconnect the office equipment — after all, without local-area networks, there is no office automation.

And so, as microprocessors began to appear in corporations, the march of the networks followed rapidly, although it was more of a stumble than a march. The problem was that neither the world's largest mainframe manufacturer, IBM, nor what was then the world's largest common carrier, AT&T, had announced a local-area network product, so the technology remained at best unsettled and largely suspect.

IBM vs. AT&T

Lately, in response to the pent-up demand for office automation products for the age of distributed everything, we are experiencing a frenzied rollout of products competing for market share. End users are growing impatient and hungry for solutions; unfortunately, they are falling prey to interim and stopgap products. DP companies are providing communications products, and vice versa.

This diversification works in the users' favor, except for the fact that each vendor's products tend to be incompatible with the others. Incompatibility was a particular problem until 1984, when finally AT&T and IBM, in May and August, respectively, blessed local-area network technology by announcing the first of their own network offerings.

AT&T's 3Bnet announcement came unheralded, dwarfed by the release of their 3B series of superminis and microcomputers. Yet it marked the opening salvo in the continuing struggle between AT&T and IBM for dominance in the corporate office. AT&T's 3Bnet consists of an Ethernet connection

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Kleinrock is president of the Technology Transfer Institute in Santa Monica, Calif. He will be a featured speaker at Communication Networks '86 (Comnet) Jan. 27-30 in Washington, D.C. Comnet is an annual conference sponsored by CW Communications, Inc.'s Conference Management Group, based in Framingham, Mass.

that offers better performance than Xerox Corp.'s Ethernet, because it limits the cable length to no more than 0.5 kilometers and allows a huge 32,768-bit packet. These are critical parameters for efficiency when carrier-sense multiple access collision detection is used as the channel access method.

IBM representatives responded by commenting that the company's favored approach to networking — token passing on a ring topology — remained two or three years away from completion, but that the user could install an IBM cabling system in preparation for the eventual announcement.

AT&T seized the opportunity and announced the PC 6300, the first of its personal computers, in July 1984. In the same month, AT&T announced the Information Systems Network (ISN), positioned as a more powerful local-area network with value-added features as well. The ISN's cost per connection stayed far below the market cost, but the net used a completely new contention resolution algorithm — one that did not conform to any of the three that the Institute of Electrical and Electronics Engineers, Inc. had recommended.

In August 1984, IBM responded and announced its advanced technology personal computer — the Personal Computer AT. Again, as with AT&T, the hardware announcement dwarfed a major IBM local-area network announcement: the PC Network. And what did the PC Network turn out to use? It uses an Ethernet connection. The network runs at 2M bit/sec. as opposed to the 10M bit/sec. speed of Ethernet and 3Bnet.

Picking up speed

So 1984 became the year that the two major players in this game blessed local-area networks. This provided some stability and exposure for the faltering network industry. Unfortunately, IBM did not release its PC Network software, PC-DOS 3.1, until spring 1985.

Meanwhile, AT&T fired the next salvo and announced its Unix PC in March 1985. Since it runs Unix, it offers multiuser capabilities. At about the same time, IBM responded with a micro-to-mainframe connection, accomplished by connecting the PC Network to a high-end IBM Series/1 acting as a file server connected to an IBM 4300 series host.

In May, it was AT&T's turn when the company announced another — AT&T's third — local-area network, the Starlan network running at 1M bit/sec. over twisted-pair cable. This represented a major release, since Starlan provides interfaces for AT&T's Unix PC, which emulates the 3270 and other IBM terminals, providing access to IBM's Systems Network Architecture (SNA) through a 3274 cluster controller; for AT&T's 3B2 microcomputer; for AT&T's PC 6300; and for IBM's Personal Computer.

The Unix PC can also communicate with AT&T's System 85 private branch exchange, which acts as a graphics data display manager and provides access to IBM's Document Interchange Architecture and Document Content Architecture.

In the same month, AT&T acknowledged that the company planned to extend access to SNA throughout its entire product line. That month, IBM responded by beginning to cut prices on its Personal Computer XTs.

During the summer, the battle continued with more product announcements. AT&T beat out IBM and Digital Equipment Corp., for a National Security Agency contract for computers and networks potentially worth close to $1 billion over the next three years. IBM itself chose not to buy IBM cable for its Boca Raton, Fla., facility. It chose fiber optics from Sonecor instead. Then came the IBM purchase of roughly one-sixth of MCI Communications Corp. After that, IBM began to roll out a number of software products for the PC Network, as well as a protocol converter that allows ASCII terminals to attach to SNA-based hosts.

Last October, IBM finally announced its Token-Ring network, a 4M bit/sec. offering. Surprise of surprises, it runs on unshielded twisted-pair wire as well as the shielded twisted-pair wire found in the IBM cabling system. The product provides a gateway between the Token-Ring network and the PC Network, an asynchronous communications server and more. Indeed, it seems that the Token-Ring will be the network to which IBM's other local-area networks can attach. (IBM also sells a token bus local-area network.)

AT&T's response was to claim that the Starlan network will soon be upgraded to 5M bit/sec., also on twisted-pair cable.

Blow for blow

So, blow for blow, the monoliths slug it out. The flurry of products has been impressive. Local-area network technology has been blessed by the major players. IBM is beginning to embrace AT&T's Unix, and AT&T is starting to incorporate IBM's PC-DOS and SNA. Both support multiple network types made up of various media, topologies and channel access methods.

We are beginning to see the vendors adopt a strategy whereby they will wire buildings with their own cable, provide offices with their local-area networks (more than one type, perhaps), put their personal computers on users desks and provide their PBX in a user's basement for access to voice, data and long-haul service (including the value-added networks) that they provide or participate in.

In the case of IBM, the network vendor will also place a mainframe in the basement for use by the entire building, provide metropolitan-area network service via microwave or

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fiber optics and provide rooftop satellite access to a service the vendor also controls.

In roughly three years, we are likely to see a variety of new developments:

- Fiber optics as the medium of choice for local-area networks.
- New advanced access methods on a chip.
- Standards for the higher levels of the International Standards Organization's seven-layer architecture.
- A stabilized cost per network connection.
- A filled-out vendor strategy for office automation.
- A continued proliferation of bridges, gateways and protocol converters to allow interconnection among all the incompatible products with which we will be working.

We now possess the power tools and the opportunity to create computerized chaos of a magnitude never before possible. To rein in the global problem, we must first understand the components of communications technology. Of course, we will be unable to confine our attention to this technology, because the natural consequence of telecommunications is to provide superaccess to all the other computer resources.

> ”
>
> ***We now possess the power tools and the opportunity to create computerized chaos of a magnitude never before possible.***

We now live in a world of local-area networks, metropolitan-area networks, cellular radio networks, value-added networks, satellite networks and internets. Each answers needs that began to arise 30 years ago when someone wheeled into a laboratory a "large-scale, high-speed, automatic digital data processing system," that is to say, an early computer. We were told it could memorize well and add numbers with blinding speed. To use it was another matter.

The early machines were enormously unfriendly from both the hardware and software viewpoints, presenting end users with a complex console of toggle switch registers, blinking lights, whirring tapes, unreliable paper tape readers and all sorts of other unfamiliar equipment. Lack of software forced end users to code in machine language or assembler.

A few brave souls — mostly dedicated scientists — would sit down, key in a program and attempt to run it. Most of the time it failed, so they would spend hours at the console trying to debug it. These end users loved this single-user mode of operation — a personal computer 30 years before its time. The end users' efficiency swelled, but the efficiency of the machine remained miserable. It stood idle most of the time as users completed slow mental and manual tasks.

As the manufacturers added more capability, complexity and cost to these systems, computer installations found it impossible to continue to support that degree of inefficiency. End users were thrown out of the computer room and had to interact with the system through an operator.

It usually took a day or two from the time a job was submitted to the operator until an end user could expect to see printed results, but this new mode of operation was enormously efficient from the machine's point of view. The machine was busy running submitted jobs all day and night — many of them aborted. From the end users' point of view, working through a system operator was horribly slow and frustrating.

Birth of time-sharing

The 1960s ushered in a new era of computing: Time-sharing was born. System designers made it possible for more than one user to access the computer at the same time, since most were performing slow tasks like typing, thinking or writing. So the end user was allowed back into the computer room, this time via a telecommunications line. Time-sharing became a huge success with end users.

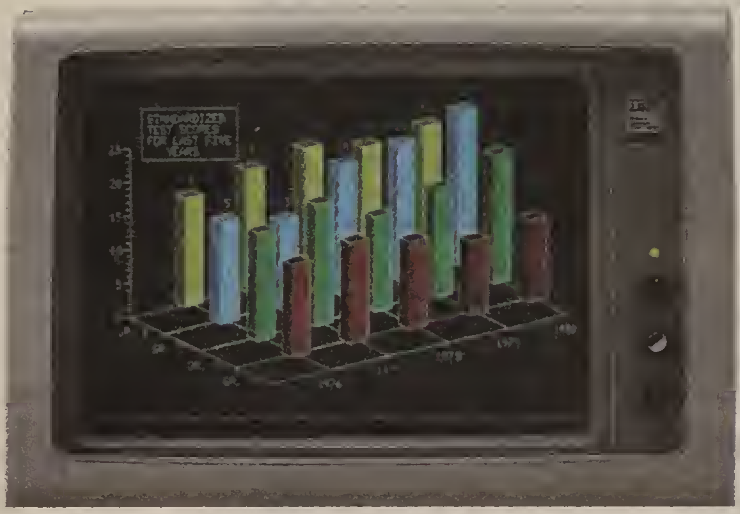
But suddenly everyone wanted access to the large computer facility buried in corporate headquarters. The obvious solution meant providing a telecommunications link from each remote terminal to the machine. But some of these remote locations were 3,000 miles away from headquarters.

Besides being expensive, these long-haul lines were wasteful. Measuring the activity on the lines revealed that they were carrying almost no data. The problem of poorly designed networks occupied designers throughout the 1960s, during which time they developed algorithms for efficient network design.

With good remote access, users began to hunger for more power in their terminals. In the 1970s, they wanted, and got, hard-copy devices, random-access memory for buffering and editing, removable storage media such as floppy and hard disks, microprocessors, minicomputers and even some mainframe processors.

This created a new class of problems. Users now found that there were a number of data processing facilities to which they wanted access for data bases, application packages, specialized hardware and messaging. What was needed was a communications service that would provide access from any terminal or

the Forte Network:



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> *As for the poor user with a terminal on his desk, how does he attach to this mess? The interface with which users are presented and the set of decisions they must make today all surround transmission media, topologies and channel access methods.*

machine to any other, no matter what the geographical separation. So the 1970s saw the growth of value-added networks, which provide efficient and low-cost access.

The architecture of these value-added systems actually consists of three networks. First, there is the underlying communications subnetwork, the value-added network itself, which consists of switches and lines that connect major computer systems. Second, there is the network of those computers — the hosts at user sites. Third, there is the local-access network, which connects outlying terminals or computers to the nearest entry point into the subnet.

Resource sharing

Sophisticated network design involves many levels of resource sharing. The resources themselves consist of the expensive long-haul wideband communications lines, the storage resources in the switching nodes and the processing capacity of the switching nodes. Value-added networks take exquisite advantage of some very important principles of resource sharing.

Large numbers. The first of these principles says that if you provide a large number of resources to a large number of users, then the total capacity required of the resources can be predicted. Capacity is equal to the sum of the average demands placed by all users. This "law of large numbers" is important in that it allows planners to ignore the fact that individual users are extremely erratic in their resource demands.

Scaling up. The second principle of resource sharing says that if you provide a high-capacity resource to a set of users requiring a lot of capacity, then it is possible to use that resource very efficiently while at the same time significantly improving the response time seen by each user. This is called "the scaling principle."

When microprocessors appeared toward the end of the 1970s, we began to see a heavy proliferation of intelligent terminals at the periphery of networks. The inefficiency of local access became a serious problem. Each peripheral terminal was attached to its own local telecommunications line, meaning that this resource is used by only one terminal — the law of large numbers did not apply. One terminal required only a small throughput so system managers provided only small communications capacity — the scaling principle did not work. The periphery of the network mired down.

Clearly, users needed the ability to "bathe" a set of terminal devices in a

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common communications medium. Enter the local-area network. Local-area networks offer inexpensive, reliable, wideband communications among devices over a limited distance, from a few kilometers down to a few centimeters.

They accomplish this by providing a common medium, be it copper wire, baseband or broadband coaxial cable, fiber optics or wireless transmission, which connects to all devices via a star, bus, tree or loop. The medium is shared by all devices via some channel access mechanism, such as carrier-sense multiple access collision detection, token passing, time division multiple access, virtual-time carrier-sense multiple access or Expressnet.

Thus, the interest in today's marketplace veers away from value-added networks. Apparently, they are so familiar that we no longer pay much attention to them. The focus of our current interest lies in local-area networks and in interconnected value-added networks, each with its own local-area network — the internetworking and gateway problem. Thus, our focus today is out at the periphery of the net (local access) and deep in the backbone of the net (gateways).

As for the poor user with a terminal on his desk, how does he attach to this mess? The interface with which users are presented and the set of decisions they must make today all surround transmission media, topologies and channel access methods. It is unfortunate, since users really do not care about the "wire wars."

Rather, they are, and properly should be, concerned with the kinds of solutions and services they can access. Among these are storage servers, education, processing servers, mail servers, data base servers, print servers and entertainment.

Technological breakthroughs in telecommunications and networking have been accompanied by similar breakthroughs in data processing. The lines between the two fields have blurred significantly. Indeed, the two fields slowly but surely converged, and an unusual synergistic relationship developed.

One does not think about data processing centers and office automation without thinking about the communications services required to make them function. There is no office automation without local-area networks. There is no corporate data base without telecommunications access to that data base. There is no distributed management structure without communications including electronic mailboxes and high-resolution document transmission.

We have become addicted to personal computers and the things they attach to via networks. There is a mounting pressure for truly portable laptop computers that can communicate and interface with our desktop and mainframe machines. Cellular radio offers a promise of mobile access for data and voice.

If it ain't broke

In the midst of all this development, users were presented with the fact of AT&T's divestiture. Notwithstanding all the rationale and reasoning for this enormous dismantling of the world's largest telephone system, users are justifiably confused. They had no reason to believe that the Bell system was broken, but they strongly suspect that divestiture itself needs fixing.

Divestiture emphasized and accelerated the need for standardization. Years before the divestiture, the Consultative Committee on International Telephony and Telegraphy recommended X.25 as a packet network interface standard; this was extremely important.

We have seen some other very important advances at the international level with the Integrated Services Digital Network (ISDN). Europeans are very aggressive in this area, especially in France, which claims to have the greatest percentage of digitized telephone equipment in the world, with 60% of its subscriber lines digitized.

The ISDN concept is very important, but many years will pass before we see a truly international implementation of ISDN services. ISDN does enable people to discuss certain standardized offerings, such as the 64K bit/sec. B channel for voice or data and the 16K bit/sec. D channel for data and signaling. But U.S. users and vendors talk about an interim 56K bit/sec. B channel. Standards are not easily agreed upon and much less easily implemented.

Other major standards efforts have come from the private sector. Notable here are IBM's SNA, DEC's Decnet and much more recently General Motors Corp.'s Manufacturing Automation Protocol.

The world is already laced with a large variety of incompatible networks. As we enter a truly distributed world with superaccess to all of its resources, we face a number of problems in addition to the technical ones. These include standards, agreement on tariffs, political issues, legal issues and sociological issues. Those softer issues will determine how quickly we enter the golden age of superaccess. ■

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How not to measure programming quality

None of the eight key variables for measuring quality has been studied in great enough depth by experts. Unless "quality" is correctly defined in terms of defects, other factors such as extensibility and maintainability hold little significance.

Part 2

By Capers Jones

Considering the importance of quality to programming's end users and the fact that defect removal is one of the top expense elements of all programming systems, the measurement of the key factors affecting quality is surprisingly underreported in software engineering literature. B. W. Boehm's monumental volume, *Software Engineering Economics* (Prentice-Hall, Inc., Englewood Cliffs, N.J., 1981), provides one of the best summaries of the available defect and quality data, but even here, critical topics such as the linkage between quality and reliability are not discussed fully.

The word "quality" carries many definitions and many ambiguities. For practical day-to-day purposes, a high-quality programming system can be considered one without defects that would cause the system to stop completely or to produce unacceptable results. Unless this definition is viewed as fundamental, then quality considerations of other factors such as extensibility, maintainability and so on have very little significance.

The measurement of quality in its fundamental meaning requires the ability to quantify these variables:

- The number of defects in the programming work products.
- The defect-removal efficiency of reviews, inspections, tests and other methods of eliminating errors.
- The "bad-fix" rate, or the quantity of new defects that are introduced while fixing previous defects.
- The origins of defects, in terms of whether they stem from requirements, design, code or some other source.
- The distribution of defects through the modules of large programming systems to isolate error-prone modules.
- The graded severity of defects, ranging from insignificant to catastrophic.
- The number of invalid defect reports, or problems that upon investigation turn out to be user mistakes or faults external to the program.
- The probability that a given defect will be encountered by more than one user of the program.

None of these eight key factors has been studied to the depth that the situation warrants, and one of the most important (factor two, or defect removal efficiency) has scarcely been dealt with at all.

Analyzing mistakes

In its simplest and most elementary form, the quality of a programming system is a function of the number of mistakes made by the designers and developers minus the defect removal efficiency of the reviews, tests and effect removal steps used to eliminate faults.

Both the number of defects and the defect removal efficiencies are tangible and finite and lend themselves to metric analysis.

For example, a study by this author indicated that large programming systems written in assembler language often had in excess of 50 defects per 1,000 source code statements, and the defect removal efficiency of all reviews, inspections and tests together totaled less than 85%.

That left in the vicinity of 7.5 defects per 1,000 source lines still latent in the program at delivery to users, and this was a critical factor during maintenance.

The study also indicated that the removal efficiency of testing was much lower than expected, with unit testing of individual modules or small programs by the programmers themselves sometimes finding fewer than 25% of the defects and even major, large-scale testing prior to delivery seldom finding more than 75% of the errors that were actually present.

Defect removal formula

Defect removal efficiency is a key factor in programming, and it should be well understood. Defect removal efficiency is defined by the following formula: Defects found by removal operation divided by defects present at removal operation equals removal efficiency.

While the formula itself is simple, it

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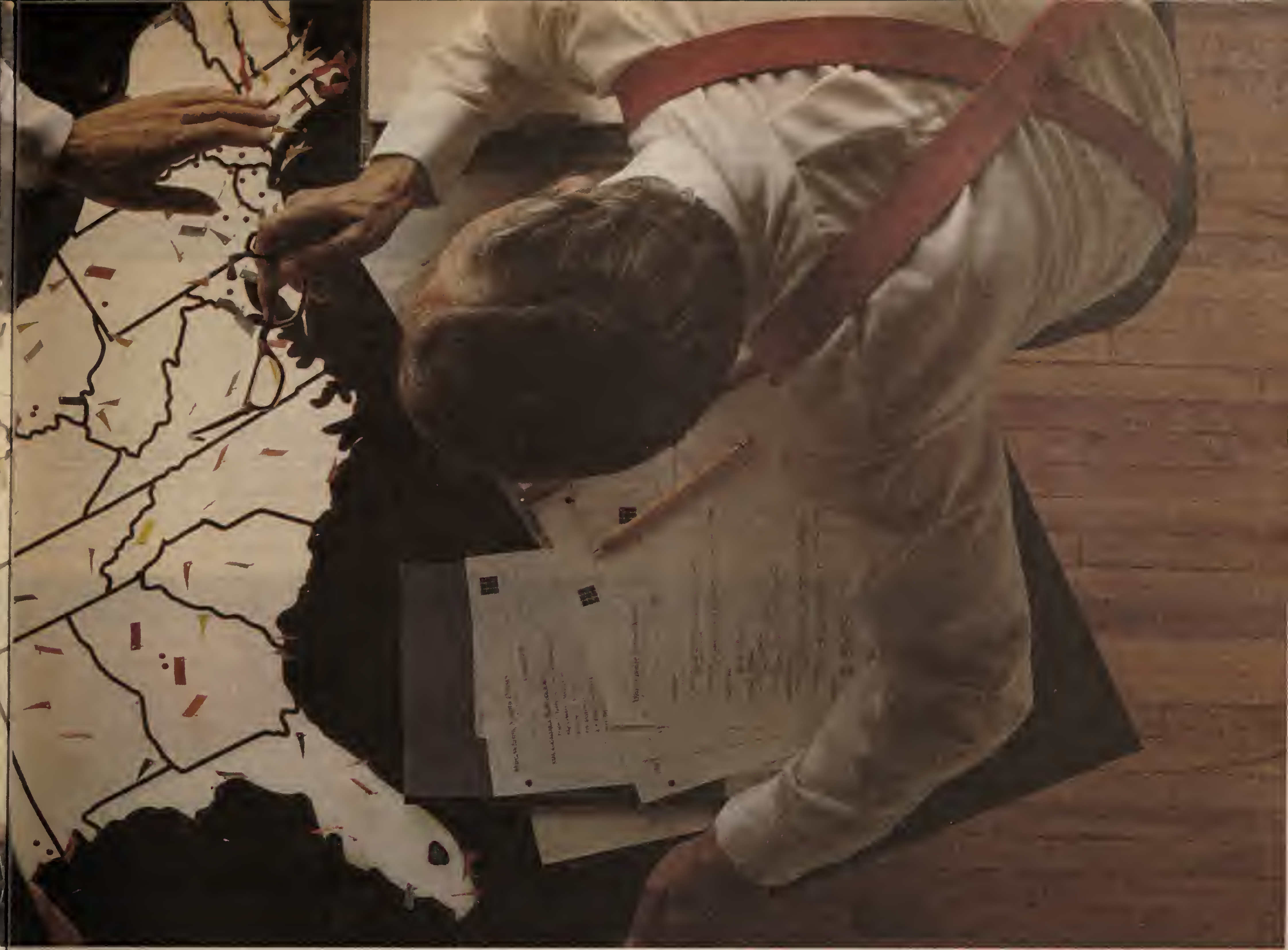
So the CEO said, "If we could automate all our key departments and tie them into our SNA network, we'd knock the competition off the map."



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is not easy to find out how many defects were present at the time of any given removal operation. Pragmatically, the efficiency of a given removal activity such as unit testing cannot be determined until somewhat later, after the defects found subsequently are totaled. IBM adopted an internal measure that evaluated all defects found during development and compared that quantity to the set of all defects found in the first year of customer usage after delivery.

There is a more immediate method that is more talked about than actually practiced. A known quantity of defects is artificially injected into a program before a defect removal operation begins, and the efficiency of the removal operation is calculated based upon the percentage of known bugs that are found. Although this method has worked reasonably well, there is no way of being sure that the "tame" bugs that were artificially injected are close enough to "wild" bugs for the results to be meaningful.

In many of the large programming systems thus studied, it has turned out that defects are not smoothly or randomly distributed through all of the code but rather that the defects tend to clump in a small number of modules now termed "error-prone modules."

In the case of IBM's IMS, only 31 modules out of the total of 425 contained 57% of all of the defects in the entire product. The distribution of defects among the modules of a large system is a very significant measurement opportunity, although one not widely utilized.

After defect removal efficiency, the second most important variable in the domain of quality is the distribution of faults, so that error-prone modules can be identified and eliminated. This means that defects should be measured down to the module level. Related measures should look for the origin of the defects, since a surprisingly large proportion of error-prone modules are not actually due to coding errors.

One of the most common reasons for error-prone modules is lack of test coverage or even any testing at all, which is often caused by failure to design the modules and enter their characteristics into the specifications turned over to test groups. In other words, some code is never tested because test personnel do not know that it has been added.

One measure already discussed that should either be avoided completely or used with extreme caution is cost per defect, since the paradoxes associated with this metric destroy its validity and usually lead to confusion and mistakes (Figure 1).

Metrics of maintenance

Of all programming activities, the field of maintenance is perhaps the most poorly covered by the software engineering literature, and it is the one for which the least reliable measurement information is available. Most of the information on maintenance is either subjective and anecdotal, such as the widely quoted claim that "maintenance costs are equal to 70% of life cycle costs," or so narrow and incomplete as to be almost useless.

Of the almost 250 periodicals on software topics, only one is devoted exclusively to maintenance: Nicholas Zvegintzov's "Software Maintenance News." Fewer than a dozen books on maintenance currently exist, with those of James Martin and Girish Parikh being perhaps the most widely known.

The definition of the term "maintenance" is so ambiguous that it covers everything from pure defect repairs to the development of major functional extensions.

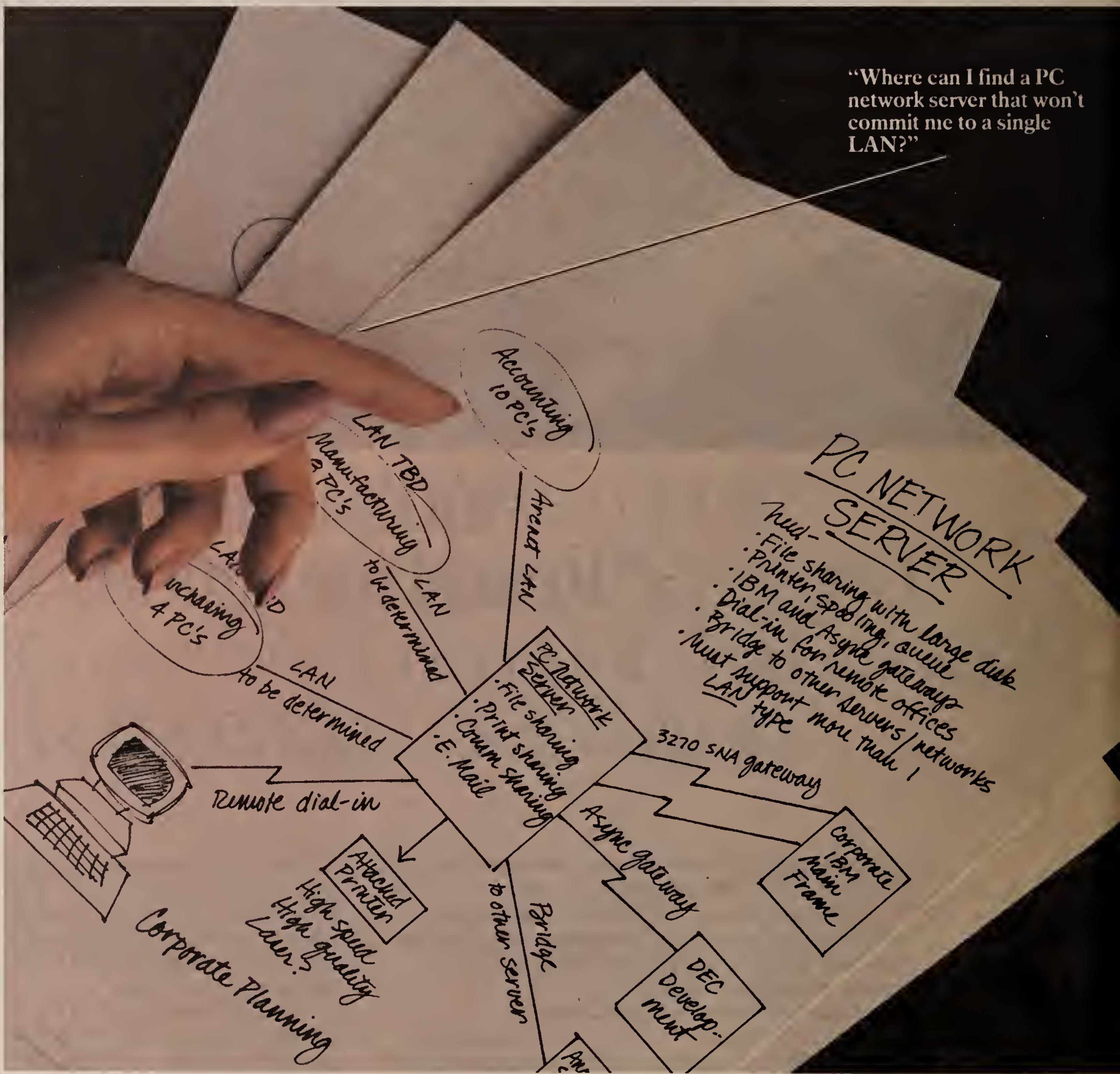
In this article, maintenance means the effort devoted to repairing defects in a programming system after the system has been delivered to its users. New features, functional enhancements or code changes made to satisfy new user requirements are excluded from this definition and will be discussed separately as enhancements.

For internal projects that are not marketed to outside customers, maintenance is often handled informally by development personnel as

Cost per defect as a productivity measurement

Activity	Low-quality Cobol program	High-quality Cobol program
Design review preparation	$ 5,000	$ 5,000
Design review execution	5,000	5,000
Defect repair	30,000	5,000
Test case preparation	5,000	5,000
Test case execution	5,000	5,000
Defect repair	50,000	5,000
Total removal costs	$100,000	$30,000
Defects removed	500	50
Cost per defect	**$ 200**	**$ 600**

Figure 1. Although total defect removal costs for the high-quality program were 70% below those of the low-quality program, the cost per defect is greater by 200%.



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the need arises. Unless the program is installed at many locations, this kind of maintenance is usually not very costly and seldom totals more than 10% of development expenses.

However, when programs are marketed to outside customers, maintenance becomes a different situation. Unfortunately, few studies have been published on the most significant cost elements of commercial maintenance. The key maintenance cost factors for commercial software (see Figure 2 page 78) are discussed below.

Delivery support. When a programming system is delivered to its users, it either can be simply mailed or picked up, which is the case with microcomputer software, or it can be installed on the user's computer system by field engineers representing the organization that developed and marketed the program. This on-site installation is such an expensive activity that for programs with more than a few hundred customers this method of installation can actually cost more than all development activities put together.

The key metrics for delivery support are the number of customer locations, the effort expended and travel costs to widely dispersed customer locations.

Field service. Once a program has been delivered and installed and the field engineers have departed, the next maintenance task to consider is, what happens when problems occur? For microcomputer software, the customer will usually telephone or visit the dealer, or there may be a hot line available from the software development organization.

However the larger computer manufacturers, such as Control Data Corp., IBM, Digital Equipment Corp. and so on, have field personnel who go to the customer's premises and assist in finding bugs and installing repairs. This kind of field service is very expensive, and for large systems with more than a few hundred customers, it can cost more than all of the development expenses put together.

It is even more costly if the customers are widely scattered geographically, so that airfare and hotel accommodations are part of the maintenance costs. The key metrics for field service are the number of defects found, the effort spent on field service and travel costs for widely dispersed customers.

Central maintenance. Many commercial software houses and some microcomputer manufacturers, such as Tandy Corp., Commodore Business Machines, Inc. and so on, have maintenance facilities staffed by programmers or systems engineers. They receive letters and telephone calls from customers who experience problems; they respond to those problems, develop fixes and then distribute the fixes by mail, networking or publication. Major computer manufacturers such as IBM may even have 24-hour maintenance locations in order to provide instant response to customer problems.

This kind of maintenance, too, is very costly, although because of the lack of travel expenses, it is the least expensive of the three major maintenance classes. Central maintenance of a program will usually not exceed 25% of the development costs unless the program is released in a very hazardous and error-prone condition. The key metrics for central maintenance are the numbers of defects encountered and the overhead costs of operating the facility.

There is another aspect of maintenance that is also underreported in the literature — the cumulative maintenance expenses of large enterprises with sizable inventories or portfolios of systems and programs in production. A medium- to large-size manufacturing organization, a state government agency or a large city data center will typically have an inventory that ranges from 500 to more than 3,000 application programs that are run on either a periodic or as-needed basis.

> ”
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> ***Maintenance is now a major worldwide programming activity, and by the end of the century, we may find that more programmers will be performing maintenance than development.***

Although no single program in the inventory may require more than slight intermittent maintenance, the cumulative maintenance bill for the entire inventory can be very expensive. The annual portfolio maintenance costs reported by Applied Computer Research, Inc. in its 1984 survey typically ranged from 30% to 40% of the total development budget, although maintenance in this case included enhancements as well as defect repairs.

Because new programs tend to enter the inventory at a slightly faster rate than that at which old programs are retired, the usual trend is for the inventory of operational applications to grow with time. Indeed, very large organizations such as major manufacturing companies, large banks, telecommunications companies, computer manufacturers and government agencies may have inventories that exceed 20 thousand separate programs and 50 million lines of source code.

A significant weakness of software measurements over much of the history of programming has been the paucity of useful metrics that have been applied to the inventories

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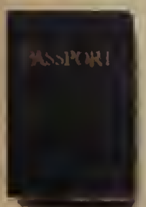

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Maintenance effort as a function of number of users

	Person-months of effort			
	1 user	10 users	100 users	1,000 users
Activity				
Development	600	600	600	600
Delivery support	1	10	50	250
Central maintenance	2	5	10	50
Field service	2	20	75	700
Total effort	**605**	**635**	**735**	**1,600**

Figure 2 shows the approximate effort needed to maintain a 100,000-source-statement Cobol program for one year. Delivery support, central maintenance and field service become increasing important factors as the 1,000-user mark is reached.

or portfolios of software in the aggregate. However, when aggregate measures are applied, the results are often interesting. The basic parameters of software inventories include the following:

- The total number of applications.
- The sizes and size ranges of the applications.
- The rate at which new applications enter the inventory.
- The rate at which old applications leave the inventory.
- The defect repairs against the inventory.
- The enhancements against the inventory.
- The staff or workers doing development.
- The staff or workers doing enhancements.
- The staff or workers doing maintenance (defect repairs).

A mathematical model by the author, based on the pattern of development, enhancement and maintenance within a large multinational corporation, indicated that at the enterprise level, pure development productivity gains would be ineffective unless coupled with quality gains. The faster new code entered production status, the greater the maintenance and enhancement costs.

These efforts would grow so rapidly that either development personnel would be drawn into maintenance, or the overall programming staff would have to increase by more than 15% a year to meet the growing load. In either case, the results would be economically catastrophic in the long run.

This kind of analysis — of productivity at the portfolio and enterprise level factoring in the balance among development, enhancements and maintenance — is the direction that contemporary productivity research is now taking.

In summary, there are six major variables affecting maintenance at the project and corporate levels that must be clearly understood to avoid confusion.

- Is the program to be installed on the user's premises by systems engineers as part of the distribution of the program?
- How many users are there for the program? And, especially, from how many separate geographic locations will the fault reports be submitted?
- What is the number of defects in the program? This variable interacts with variable two because some defects will be encountered by many users of the program and, hence, will trigger multiple fault reports for the same problem.
- Will defects reported by customers lead to the dispatch of field service personnel to explore the problems on the customer's premises?
- What tools and support systems are available for reporting defects from the field, searching for common

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■ What is the cumulative inventory of software packages that must be maintained by an enterprise? At the corporate or government level, this variable is a critical factor in determining overall maintenance expenses.

Maintenance is now a major worldwide programming activity, and as the industry matures, by the end of the century we may find that more programmers will be performing maintenance than development. In order to deal with maintenance at a scientific and professional level, it is necessary to replace the anecdotal and mistaken assertions about maintenance with reports based on serious studies.

Also, maintenance at the corporate or government agency level, where thousands of applications and millions of lines of source code may be involved, is a field of research distinct from that of maintenance of a single program. The notable differences in metrics, costs, tools and staffing between maintaining a single program and maintaining a portfolio of many programs deserves much more research.

Functional enhancements

Because programming is a new industry whose age spans only some 30 years, most professional programmers say they believe the primary work of the occupation is the design and development of new systems, starting with requirements and concluding with delivery. Certainly the software engineering literature encourages such a belief, since a visit to a major computer science bookstore will turn up more than 200 titles in print dealing with new program development and its methods.

However, as the software industry matures and moves toward the end of the 20th century, something unexpected is happening. Many programmers find themselves working on enhancements to existing systems rather than doing new development. For example, of the approximately 15,000 professional programmers in the IBM corporation as of 1983, it is probable that 10,000 were working on adding features and extensions to the existing operating systems and major application programs such as IMS, CICS and the like.

The unexpected change from new development work to functional enhancements is causing several unanticipated problems. One of the most severe problems is that since enhancements are usually lower in technical interest to programming personnel than new development, enterprises locked into significant amounts of enhancement work may find low morale and high turnover rates. Even IBM, which traditionally has one of the lowest attrition rates in the industry among its programming staff, is finding that programmers working on enhancements to existing systems may leave in significant numbers, compared with the historical turnover of those working on new projects.

From the point of view of measurement and estimation, the unexpected change from new development to functional enhancements may be disastrous because the ratios and cost elements for working on existing code are very different from those involved in new code. Unfortunately, a review by the author of more than 50 books on programming methodologies revealed almost no citations dealing with the productivity of functional enhancements, except a few minor references in the context of maintenance.

The work of functional enhancements to existing software systems is underreported in the software engineering curriculums, too, and very few courses exist in which this kind of programming is even discussed, much less taught effectively.

The major difference between new development and enhancement work is the enormous impact that the base system has on key activities. For example, while a new system might start with exploring users' requirements and then move into design, an enhancement project will often force the users' requirements to fit into existing data and structural

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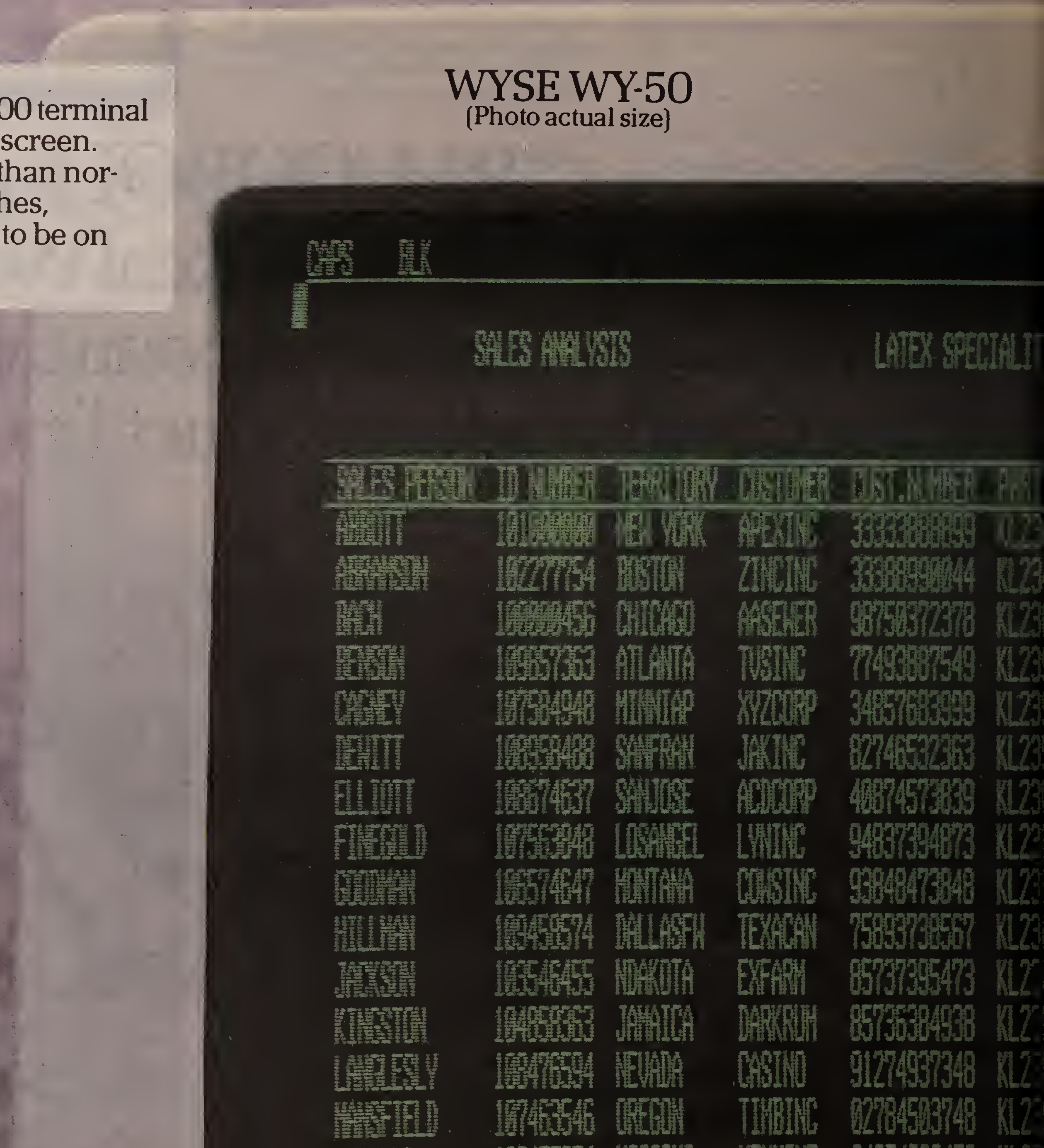

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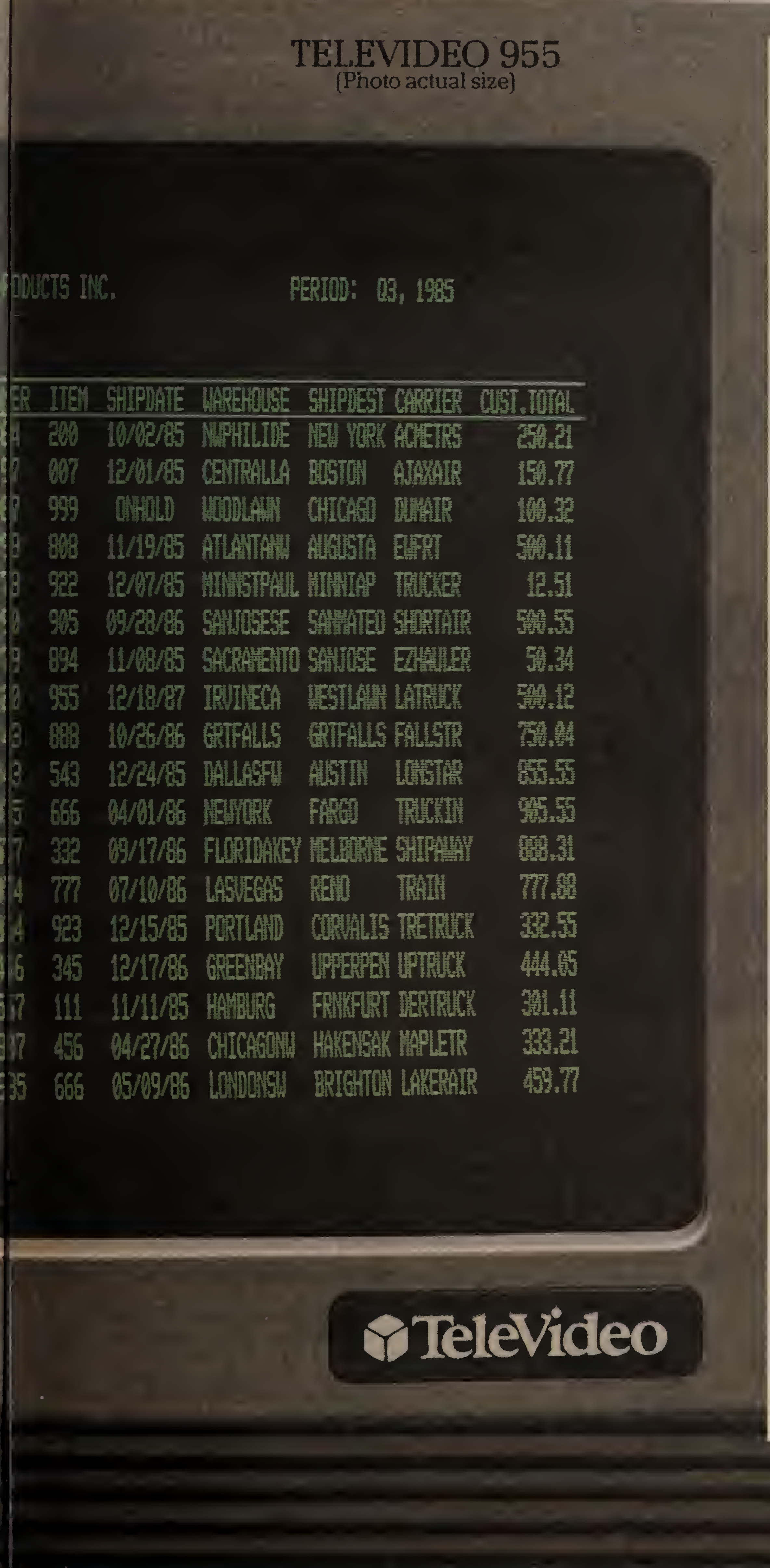

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constraints, and much of the design effort will be devoted to exploring the current programs to find out how and where new features can be added and what their impact will be on existing functions.

The task of making functional enhancements to existing systems can be likened to the architectural work of adding a new room to an existing building. The design will be severely constrained by the existing structure, and both the architect and the builders must take care not to weaken the existing structure when the additions are made. Although the costs of the new room usually will be lower than the costs of constructing an entirely new building, the costs per square foot may be much higher because of the need to remove existing walls, reroute plumbing and electrical circuits and take special care to avoid disrupting the current site.

> ”
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> ***The current practice in software engineering of lumping maintenance and enhancements together is unfortunate, since it distorts both activities and leads to confusion and mistakes in estimating.***

When the major tasks of enhancing an existing system are compared with the tasks of developing a new system, it may be seen that notable differences exist in the constraints if new development is taken as the normal mode of operation.

From the point of view of measurement and estimating, the work of enhancing an existing system tends to be much more costly than new development work for the tasks of coding, integration and testing and especially for defect repairs if the base system is not well structured and very stable. A side-by-side comparison of the effort to develop a new 10,000-line Cobol program with the effort required to add 10,000 lines of Cobol enhancements to an existing 50,000-line Cobol system reveals this trend.

The impact of base code tends to make coding, integration, testing and defect repairs much more significant tasks in enhancement work than in new development, while documentation is essentially unchanged and requirements and design are affected slightly. Indeed, requirements and design effort for enhancements may sometimes be lower than for a new development project of equivalent size because both users and developers know the base system quite well.

However, ratios and cost-estimating techniques based on new development work will be totally misleading and unreliable when transferred to enhancement projects. This is one reason why almost all interactive estimating systems either do not work for enhancements or use very different algorithms for dealing with enhancements to existing systems.

Failure to come to grips with enhancements is also one of the reasons why software engineering literature cannot simply be accepted at face value. Many large-scale statistical studies include enhancement work side-by-side with new development work, and the authors of the studies do not distinguish between the two kinds of programming.

A final problem concerning enhancement work is the way that it is usually lumped together with the tasks of defect repairs or maintenance. The only thing that enhancements have in common with maintenance, in the sense of fixing post-delivery bugs, is that they both change existing software.

In many enterprises, enhancements are funded differently, carried out by different organizations and logically distinct from the defect-repair tasks. The current practice in software engineering of lumping maintenance and enhancements together is unfortunate, since it distorts both activities and leads to confusion and mistakes in estimating.

Weakest link

Software measurement has been the weakest link in the chain of technologies comprising software engineering. The common metrics applied to software projects, such as lines of code per unit of time and cost per defect, are subject to such dangerous and misleading mathematical paradoxes that the understanding of software economics has been delayed. The lack of any standard definitions for those metrics has introduced potential errors in excess of two orders of magnitude into the software productivity literature.

In addition to the numerical aspects of software measurement, the industry has also blurred nine different concepts together without full realization of their significance:

- Measures of time.
- Measures of cost.
- Measures of yield.
- Development projects.
- Enhancement projects.
- Maintenance projects.
- Personal productivity.
- Project productivity.
- Enterprise productivity.

In the philosophy of Zen Buddhism, emptiness is the source of creativity; before a cup can be filled, it must first be empty. Before a new science of software measurement can be created, it is first necessary to eliminate the paradoxes and ambiguities of the historical software metrics that have obscured the true economic and productivity trends of the software engineering domain. ■

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IBM micros get 286 Express accelerator card

PC Technologies, Inc. of Ann Arbor, Mich., has introduced its 286 Express accelerator card for the IBM Personal Computer and the Personal Computer XT.

The card is powered by Intel Corp.'s 80286 8-MHz microprocessor, with an optional 8027 8-MHz math coprocessor. According to the vendor, it fits in a half slot, requires no new or bundled memory and needs no special operating software.

The 286 Express is said to function 30% faster than an IBM Personal Computer AT and 200% to 600% faster than an IBM Personal Computer XT in most IBM PC-DOS applications. The card is fully compatible with most PC-DOS software.

Zero-wait access

The 8K-byte cache memory provides zero-wait access to the most recently used code and data.

The vendor claimed that the 286 Express card operates with all existing backplane cards. It operates with local-area networks and mainframe communications products and conforms to the Lotus/Intel/Microsoft Expanded Memory Specification.

The card is also compatible with the IBM 3270 Personal Computer Model GX.

The 286 Express costs $795.

Net management tools bow

Bridge announces Ethernet gateway, net control server

Bridge Communications, Inc. of Mountain View, Calif., has added an Ethernet-to-broadband gateway and an Ethernet network management server to its family of local-area network products running the TCP/IP protocol commonly used in government and engineering applications.

The GS/6-IP gateway server is an internetwork router that permits communications among up to 255 TCP/IP-based Ethernet networks over a single 6-MHz CATV broadband channel.

Reportedly, it will facilitate the creation of very large networks based on the TCP/IP protocol. According to a spokesman, the GS/6-IP filters network traffic so a message is sent only to the address for which it was intended.

The NCS/150-TCP/IP network control server is said to give users of TCP/IP-based Ethernets an ongoing record of all network activity at the individual session level.

The server compiles a complete audit trail, including records of connections, disconnections, session duration, number of packets and bytes tranferred. Alarms can be set to monitor critical network parameters, such as alignment errors and node removal; the user is notified on the system's console or printer if a parameter threshold is exceeded.

The NCS/150-TCP/IP network control server is said to support up to 40 Bridge communications servers. It loads operating system software, configuration files, resource names and utility programs from its 1M-byte floppy disk drive into remote diskless servers.

The GS/6-IP costs $10,500 plus a $250 annual software license fee, and the NCS/150-TCP/IP costs $5,900 plus an annual $750 software license fee.

Ryan-McFarland introduces Fortran 77 certified compiler

Ryan-McFarland Corp. of Rolling Hills Estates, Calif., has begun shipping RM/Fortran V.2 for Intel Corp. 80286-based IBM Personal Computer ATs, compatibles and Altos Computer Systems, Inc. 2086 computers running under the Microsoft Corp. Xenix operating system.

According to the vendor, RM/Fortran is the only compiler available for personal computers that is a full Fortran 77, certified by General Services Administration to be as error-free as possible. It also carries Digital Equipment Corp. VAX, VS and Fortran 66 language extensions frequently used in mainframe applications.

The product is said to have enhanced execution speed and language features, ease-of-use upgrades and new utilities.

The language enhancements, including support for Complex 16 data types and mixing numerics and characters in certain expressions, extend RM/Fortran's ability to support Fortran applications developed for use on mainframes.

The Xenix implementation of RM/Fortran can execute source code developed under DOS versions of the compiler. Migration of DOS applications to Xenix requires recompilation only.

RM/Fortran V.2 for Xenix requires an Intel 80287 floating-point arithmetic coprocessor, the Xenix operating system and the Xenix Software Development System. RM/Fortran V.2 costs $750.

According to the vendor, there will be RM/Fortran V.2 implementations available shortly for 80286 machines running under AT&T Unix System 5.

Tecmar board uses 1.25M RAM disk

Tecmar, Inc. of Solon, Ohio has introduced an add-on board for IBM Personal Computers and compatibles that is said to combine standard multifunction capabilities with the speed of a 1.25M-byte random-access memory (RAM) disk.

The board, called Megafunction, provides a nonvolatile RAM disk with an independent power supply. This eliminates the need to access hard or floppy disks and does not drain system memory. Other features of the board are 1.25M bytes of memory, a parallel printer port, a serial printer port and a clock/calendar.

Because the RAM disk has an auxiliary power supply, programs copied onto it, such as Lotus Development Corp.'s 1-2-3, will remain there even after the computer is shut off. According to the vendor, Megafunction does not occupy any system memory below 640K bytes. Megafunction has an on-board read-only memory that allows users to boot directly from the RAM disk.

Megafunction comes with 24 business and personal software programs. It costs $895.

Logicraft brings color graphics to VAX

Grafvax allows users acccess to personal computer software

Logicraft, Inc. of Nashua, N.H., has announced Grafvax, a color graphics workstation designed to bring color graphics and personal computer compatibility to the Digital Equipment Corp. VAX environment.

Grafvax is a color graphics workstation that is a bus extension of Logicraft's Cardware product line. According to the vendor, it allows users of the VAX to have access to personal computer graphics software and hardware for computer-aided engineering, computer-aided design and presentation graphics applications.

For instance, the user can execute programs such as Lotus Development Corp.'s 1-2-3 and Ashton-Tate's Framework while retaining full access to the DEC peripherals and data-sharing networks. Graphvax can reportedly be used as a DEC VT100 terminal when not being used for microcomputer-based programs.

Grafvax is available in two models. The Q-Bus version is the Model QCP-11+/G that plugs directly into the DEC Q-Bus. It is a one-user quad-width card that supports one 8-MHz Intel Corp. 8088 processor, up to 768K bytes of memory and two serial ports with optional 8087 coprocessors. Model QCP-11+/G costs $2,990 per user.

Model HCP-11/G is the Unibus version. It is a two-user hex-width card that supports two 8-MHz Intel Corp. 8088 processors, up to 768K bytes of memory per processor and up to two serial ports per user with optional 8087 coprocessors. It can be located up to 4,000 feet from the DEC host system. The Unibus model costs $5,980 per unit.

Grafvax is equipped with six expansion slots said to accommodate any standard microcomputer-compatible peripheral card, allowing each workstation to be individually tailored with whatever peripherals suit its applications. Either the standard DEC or a microcomputer-compatible keyboard can be used.

Data is transferred between the DEC computer and the Grafvax workstation by standard coaxial cable at 2M bit/sec. Also, according to the vendor, data output can be spooled to the shared devices on the DEC system.

SOFTWARE & SERVICES

Systems software

Software Assistance has announced **SA/Sort** for IBM's VM operating system.

SA/Sort is a single module that provides an alternative to the VM SORT command. It provides both ascending and descending sequencing. It reduces the amount of SIO, VTIME, TTIME commands and real-time required for a sort operation.

SA/Sort is available with maintenance support for a one- or three-year lease for $1,000 or $2,250, respectively. The purchase price is $5,000.

Software Assistance, P.O. Box 2101, Santa Clara, Calif. 95055.

■

GT Software, Inc. has announced **Assist/GT Release 1.3** for CICS users.

Assist/GT comprises Tutor/GT, a Help screen processor/tutorial facility; Menu/GT, a menu processor/transaction initiation facility; and DOCM/GT, a utility for producing online and hard-copy documentation.

Release 1.3 offers variable Help windows on a field level without program modifications. Menu/GT now allows transaction-level security. DOCM/GT allows an installation to put documents on-line.

Permanent licenses for VSE start at $4,500 and for OS at $5,500, the vendor said.

GT Software, 4411 E. Jones Bridge Road, Norcross, Ga. 30092.

■

General Electric Co. is offering **GE-MIMS-Plus**, a maintenance information management system said to identify machines that need to be replaced or upgraded.

The software controls work orders for scheduled and unscheduled maintenance. It also maintains an up-to-date data base of equipment characteristics and availability, personnel skills and status and preventive maintenance schedules.

GE-MIMS-Plus operates on Digital Equipment Corp. VAX series computers running VMS. Software licenses range from $50,000 to $125,000.

GE, Industrial Automation Systems Department, 12 Corporate Woods Blvd., Albany, N.Y. 12211.

■

Ecad, Inc. has released an AT&T Unix version of its **Simon** digital MOS circuit simulator.

The Unix version works on Apollo Computer, Inc., Elxsi, Gould, Inc., Ridge Computers, Inc., Sun Microsystems, Inc. and Digital Equipment Corp. VAX-11/700 series computers.

Simon offers capacitance and user-definable model capabilities.

Prices start at $15,000.

Ecad, 2455 Augustine Drive, Santa Clara, Calif. 95054.

■

General Electric Co. has upgraded its numerical control and monitoring system, **NCAM-Plus**, to interface with and share a common data base with its computer-aided process planning system, tool inventory control system and shop information management system.

NCAM-Plus operates on Digital Equipment Corp. VAX hosts and on a series of RT103 Intelligent Factory Terminals.

Software is available for all VAX systems ranging from the Microvax to the 8600. Prices range from $150,000 to $750,000.

GE, Industrial Automation Systems Department, 12 Corporate Woods Blvd., Albany, N.Y. 12211.

■

TIMS-Plus, a tool inventory management system that tracks and locates durable and perishable tools in a tool crib in use, in transit or in repair, was unwrapped by **General Electric Co.**

The system includes a relational data base of tool crib inventory information, menu-driven crib attendant functions and display of current tool locations and usage.

TIMS-Plus can run stand-alone or interface with materials requirements planning, process planning or equipment maintenance programs.

The package operates on Digital Equipment Corp. VAX computers. Licenses range from $50,000 to $125,000.

GE, Industrial Automation Systems Department, 12 Corporate Woods Blvd., Albany, N.Y. 12211.

Productivity aids

TBS, Inc. has announced **Snoop**, an IBM CICS diagnostic tool designed to provide detailed information on any CICS resource.

Snoop deciphers retrieved data and outputs a display in English. It identifies daily application and systems problems. Inquiries are made using Help screens or logical keywords. Resources can be viewed and understood to detect potential problems.

A perpetual license for Snoop is priced at $8,000 for MVS systems and $6,000 for DOS.

TBS, 53 W. Fort Lee, Bogota, N.J. 07603.

■

C A Electronics, Inc. has introduced **Writeto**, a software utility.

Writeto enables Writeone users to utilize the advanced printing capabilities of certain dot matrix printers such as Burroughs Corp.'s AP1351 and Okidata Corp.'s 92/93 family. Writeto is supported by all Convergent Technologies, Inc. workstations

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4900 Old Ironsides Drive, M/S 626 Santa Clara, CA 95054.

and Megaframes. It features underlining, boldface type, correspondence quality, superscript, subscript and microjustification.

Writeto is priced at $250.

C A Electronics, 640 Lancaster Ave., Frazer, Pa. 19355.

Languages

BSO, Inc. has announced the **68HC11 relocatable assembler** for the Motorola, Inc. 68HC11.

The 68HC11 assembler operates on Digital Equipment Corp.'s VAX, Microvax and PDP-11 computers. It supports the Motorola-specified instruction set mnemonically and syntactically. It provides full relocation facilities, conditional code and macro capabilities as well as a wide array of other advanced assembly language features including unlimited symbol storage, the vendor said.

The assembler provides upward compatibility with most Motorola formatted macros. Prices begin at $3,900.

BSO, 128 Technology Center, Waltham, Mass. 02254.

MICROCOMPUTERS

Software

Experience In Software, Inc. has introduced **The Idea Generator**, an expert-based software program designed to help users solve problems.

The program has three sections: the problem statement, the idea generation section and the evaluation. It is menu-driven and offers an idea screen notepad and printing options.

The Idea Generator runs on the IBM Personal Computer and compatibles with a minimum of 256K bytes of memory as well as a double disk drive or a hard disk and a floppy disk drive.

The Idea Generator costs $195.

Experience In Software, Suite 401, 2039 Shattuck Ave., Berkeley, Calif. 94704.

■

IBM has announced **IBM 3270-PC Color Graphics Charting** for use with its 3270 Personal Computer AT/G, AT/GX, 3270-PC/G and PC/GX.

Color Graphics Charting is a menu-based graphics interface that provides workstations with a local business charting capability when used with the 3270-PC Graphics Control program.

Features include extensive Help, picture management file, flexible chart data input facilities, wide range of chart types, chart delimiters, chart annotation, computational facilities, file conversion and picture interchange via the 3270-PC File Transfer program.

The 3270-PC Color Graphics Charting program is licensed for $395.

IBM, Old Orchard Road, Armonk, N.Y. 10504.

■

Individual Software, Inc. has announced a training program called **Individual Training for Project Management**.

The program teaches commonly used project management techniques such as the Critical Path Method and Program Evaluation and Review Technique.

The course is composed of an introduction, lessons and exercises. It runs on the IBM family of Personal Computers and compatibles. Minimum system requirements are 128K bytes of memory, Microsoft Corp. MS-DOS or IBM PC-DOS 2 and higher, at least one diskette drive and an 80-col. monitor. The course costs $69.95.

Individual Software, 1163-1 Chess Drive, Foster City, Calif. 94404.

■

Keller Software has announced **Laserjet WKS**, a printer utility for the Hewlett-Packard Co. Laserjet printer when used with Lotus Development Corp. 1-2-3 work sheets.

Laserjet WKS allows spreadsheet users to combine and print up to 233 font styles by directly embedding the printer codes into the worksheet. It contains over 200 different character setup strings.

Laserjet WKS is priced at $39 plus $3 for shipping and handling.

Keller Software, 1825 Westcliff Drive, Newport Beach, Calif. 92660.

■

Softworks Development has introduced **PC-Outline**, an outlining software package for the IBM Personal Computer.

PC-Outline features outline rearrangement functions, automatic numbering, editing capabilities, windowing and data transfer with other programs.

PC-Outline requires IBM PC-DOS or Microsoft Corp. MS-DOS Version 2 or greater, one floppy disk drive and 128K bytes of random-access memory. PC-Outline is priced at $49.95.

Softworks Development, 750 Stierlin Road #142, Mountain View, Calif. 94043.

■

Urban Decision Systems, Inc. has introduced the **Onsite/PC** demographic data retrieval system.

Onsite/PC runs on the IBM Personal Computer AT/370 or XT/370. It allows users to retrieve demographic and other geographically organized data. It generates reports, color graphics images and machine-readable data outputs for any selection of data and for any user-defined area in the U.S. It is available for individual states, for 18 Urban Decision Systems regions or for the entire U.S.

The annual license fee for the entire U.S. is $20,000. For one region, it

Continued on page 88

folks. So you can forget about publishing reams of short memos. Its voice prompts guide you step by step. So there's no chance for miscommunication. Problems are solved. Decisions are moved along.

It works wonders with most any business telephone system. It'll cater to forty folks or a thousand — simply, swiftly, cost-effectively.

Of course, only ROLM has PhoneMail. That's not surprising. We're the folks who taught telephones and computers and people how to work together. We can show you the most advanced ways to manage voice and data today, next year and into the next century.

If your business phone system has you talking to yourself, it's time to talk to ROLM.

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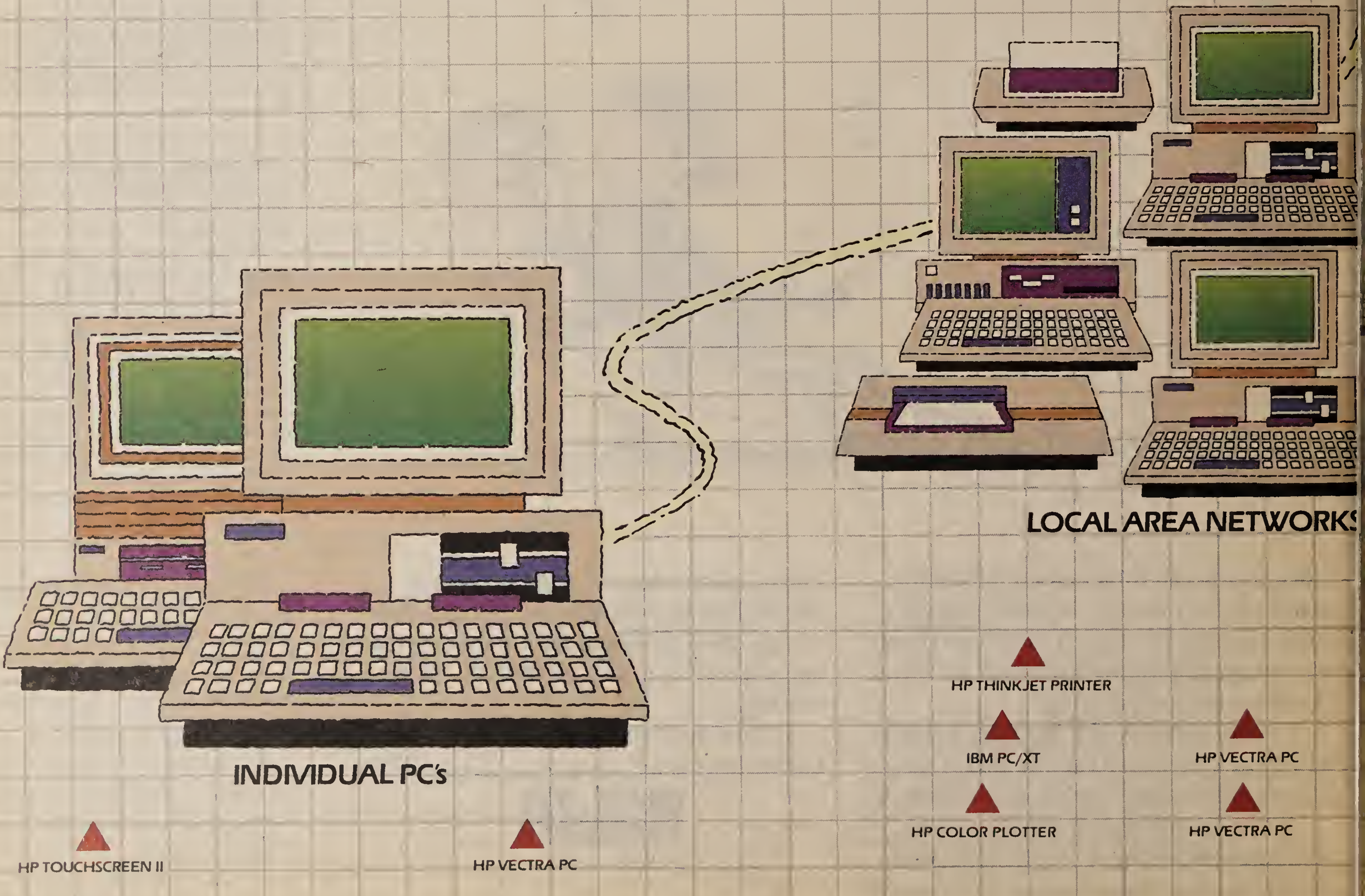
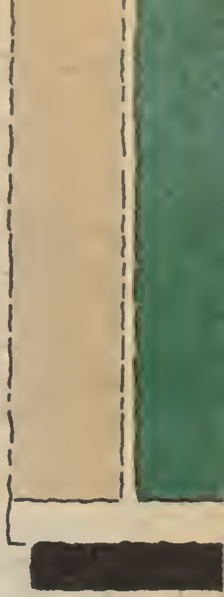
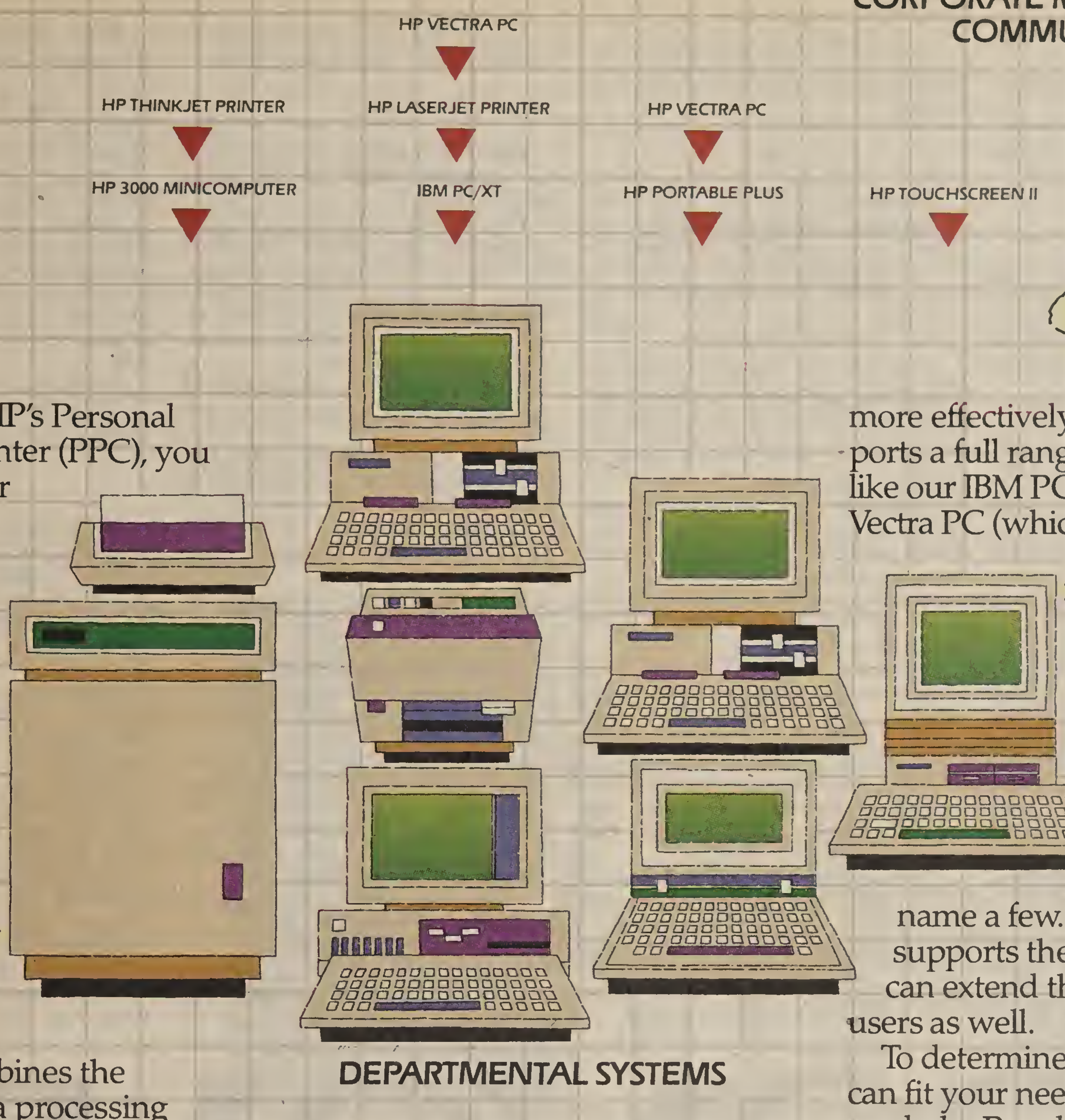
800-538-8154. (In Alaska, California and Hawaii, call 408-986-3025.)

"What if...

you could grow from one PC to a network of a thousand without losing control?"

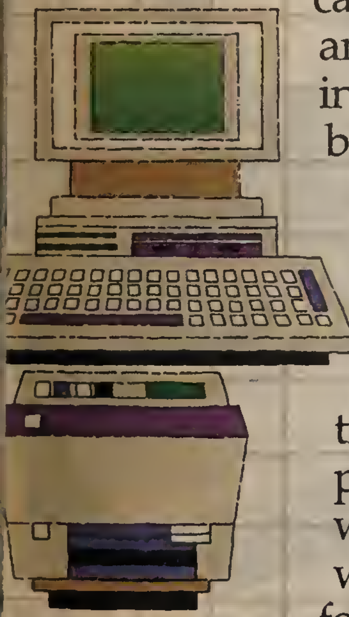






In fact, with HP's Personal Productivity Center (PPC), you can start small or big and create a compatible office information system. A system that lets you manage growth easily. A system that can change as you change, grow as you grow.

The PPC combines the strengths of data processing and personal computing. So individuals, work groups, departments or entire corporations can access, share and exchange information better.



Naturally, this lets your people work smarter and more productively. But improving the way your people work with information is just part of the story.

PPC products are compatible across a wide range (more so than even IBM), so you can easily alter, upgrade or expand a PPC configuration. Without re-writing one line of software.

For instance, a PPC can be just a few PC's, a local area network, a departmental system based around an HP 3000 minicomputer or a company-wide information network that ties together *multiple* PPC's. Where you go from there is up to you. It's that flexible.

The PPC is flexible in other ways, too.

It can include advanced electronic mail, easy database access from PC's, and IBM mainframe communications that let your people manage information more effectively. The PPC supports a full range of HP products like our IBM PC/AT compatible Vectra PC (which, by the way, is 30% smaller and 30% faster than the IBM PC/AT), The Portable and HP LaserJet printers, to name a few. And since it also supports the IBM PC's, you can extend the PPC to these users as well.

To determine how the PPC can fit your needs, HP people can help. People who don't just sell products, they solve problems. People who follow through with service and support programs. People you can count on to deliver the right Personal Productivity Center... no matter what size you are, or how big you wish to grow.

Find out how we can help. For the number of your nearest authorized HP dealer or sales office, call 1 800 345-6366, Dept. 282E today.

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Business Computing Systems

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Continued from page 85

is $14,000. For one state, it is $8,500, and for each additional computer, it costs $500.

Urban Decision Systems, P.O. Box 25953, 2032 Armacost Ave., Los Angeles, Calif. 90025.

* * *

Rexon Business Machines Corp. released **PC Harmony**, a data link and terminal emulation software package that allows the IBM Personal Computer to appear as a Rexon terminal on any Rexon system.

The data link provides bidirectional data transfer at speeds ranging from 300 to 9.6K bit/sec. The package requires 256K bytes of random-access memory, one floppy disk drive, an asynchronous communications card and Microsoft Corp. MS-DOS 2 or higher. It costs $695.

Rexon, 5800 Uplander Way, Culver City, Calif. 90230.

* * *

Writing Consultants has enhanced its memory-resident **Word Finder** electronic thesaurus software for IBM Personal Computers and compatibles.

Word Finder Version 3 features 15,000 main word entries and 220,500 synonyms. Other enhancements include the ability to select the nearest matching word when the exact word is not found, to unload the program from random-access memory when memory is required for another program and to switch between word processors. It costs $79.95.

Writing Consultants, Suite 103, 300 Main St., East Rochester, N.Y. 14445.

* * *

Luminex Corp. has announced **Pixelmove**, **Lumiview** and **Windowpane**, three graphics packages for the IBM Personal Computer, Personal Computer XT and AT as well as the Compaq Computer Corp. Compaq, AT&T 6300 and compatibles.

Pixelmove is a graphics communications tool designed to transfer images generated by the AT&T True Vision Capture board or Chorus Data Systems, Inc. PC Eye via a 1,200 or 2,400 bit/sec. modem.

Lumiview is a three-dimensional graphics primitives package. It supports medium- and high-resolution graphics boards.

Windowpane is a graphics window manager and menu data base. Each program costs $99.

Luminex, Suite 818, 7700 Edgewater Drive, Oakland, Calif. 94621.

* * *

United Software Security, Inc. has released Version 2.02 of its **Privacyplus** software package.

Privacyplus 2.02 is fully compatible with the IBM Enhanced Graphics Adapter.

All current site and corporate licensed customers will be shipped the update free of charge. Single copies of Privacyplus are priced at $195.

United Software Security, 8133 Leesburg Pike, Vienna, Va. 22180.

* * *

Palantir Software has announced the **Palantir Filer** for Microsoft Corp. Windows.

Palantir Filer includes nine levels of indexing and sorting, 150 fields per record, four-function conditional math, full mouse interface, pull-down menus and a full-featured report generator. It fully supports Windows multitasking features such as sorting or indexing a data file while the user works in Microsoft Paint and Write.

The software runs on an IBM Personal Computer or compatible. It is priced at $145.

Palantir Software, Suite 100, 12777 Jones Road, Houston, Texas 77070.

* * *

Softkey Software Products, Inc. has enhanced its **Keylibrarian** personal reference library data base and report manager.

Keylibrarian 1.5 includes the ability to sort any field and create dictionaries that can be cross-referenced by title or subject. Keylibrarian's report generator will create hard-copy reports and bibliographies.

The record capacity has been expanded to 33,000 records.

Keylibrarian costs $295.

Softkey Software Products, Suite 404, 260 Richmond St. W., Toronto, Ontario, Canada M5V 1W5.

* * *

Wiley Professional Software has introduced **Survcalc**, a statistical survival analysis software program for the IBM Personal Computer designed to calculate life expectancies of capital equipment.

Survcalc projects time-change spans for equipment components; calculates the life expectancies of hardware, heavy equipment and major appliances; computes life tables; defines mortality curves in demography; and assists in the study of actual and potential environmental hazards.

Survcalc is priced at $125.

Wiley Professional Software, 605 Third Ave., New York, N.Y. 10158.

* * *

Micro Focus, Inc. has enhanced its **Micro/SPF** program development tool for the IBM Personal Computer.

The Micro/SPF software sets up an operating environment that models the interactive system productivity facility environment. The system supports Browse and Edit capabilities and uses mainframe partitioned data set style names on the Personal Computer.

It supports library utilities, programmable function keys and execution of IBM PC-DOS or Microsoft Corp. MS-DOS commands.

Micro/SPF supports calling the Micro Focus VS Cobol Workbench system and interfaces to the VDAM micro-to-mainframe link system.

The Micro/SPF costs $175.

Micro Focus, 2465 E. Bayshore Road, Palo Alto, Calif. 94303.

ECONOMY

The #1 3270 alternative for people who value a better bottom line.

More and more companies are building or expanding their 3270 network at a lower cost without compromising performance. The solution: Telex.

The Telex 078 and 079 displays bring full 3270 terminal performance and user comforts together with cost savings. These complete 3270 plug compatible displays are loaded with standard features. They're ergonomically designed to save space and flexible enough to support a display printer, extended highlighting, APL, a light pen and a choice of keyboards.

And to make top performance and low cost an even better value, Telex backs its products with over 2,000 Telex-dedicated service and support people worldwide.

That's why so many companies value Telex as their #1 3270 alternative. And that's the bottom line.

For more information contact John Hawkins, 6422 E. 41st Street, Tulsa, OK 74135/1-800-331-2623.

The #1
3270 Alternative

TELEX®

TELEX COMPUTER PRODUCTS, INC.

NEW PRODUCTS/MICROCOMPUTERS

Computer Covenant Corp. released **Direct Marketing**, a system designed to aid sales and marketing personnel.

Direct Marketing maintains a list of sales prospects showing each lead's source, sales activity, literature requested, qualification and disposition. Selective retrievals can be made and reports can be generated.

The package runs on the Digital Equipment Corp. PDP-11, VAX or Rainbow, the IBM Personal Computer and compatibles, as well as systems using the AT&T Unix or Microsoft Corp. Xenix operating systems.

Prices range from $750 to $2,000.

Computer Covenant, 790 Farmington Ave., Farmington, Conn. 06032.

■

Micro Business Applications, Inc., Arthur Young and Co. and the National Association of Small Business Investment Companies (NASBIC) announced **Venture-Trak**, a software product designed for venture capital firms.

Venture-Trak tracks all deals from initial contact through the final exiting of the portfolio company. It has management reports, spreadsheet templates designed for use with Lotus Development Corp. 1-2-3 and a loan amortization program.

Venture-Trak is priced at $1,900 for NASBIC members and $2,400 for nonmembers.

Micro Business Applications, 12281 Nicollet Ave. S., Minneapolis, Minn. 55337.

■

Telemet America, Inc. has announced the **Radio Exchange**, a digital radio interface for personal computers, and **Personal Gains**, an accompanying software program.

The Radio Exchange allows access to daily business news and financial data. The basic service includes delayed quotations on the New York Stock Exchange and real-time quotations on all options exchanges and major market indexes.

Personal Gains allows Radio Exchange users to perform analyses and store and retrieve price and volume data.

System requirements are an IBM Personal Computer, Personal Computer XT, AT or compatible, 192K bytes of random-access memory, one serial port and two disk drives. Personal Gains Software costs $394. The basic subscription fee for Radio Exchange is $25 per month.

Telemet America, 515 Wythe St., Alexandria, Va. 22314.

■

Semi-Custom Software, Ltd. introduced **Semi-Custom** software, designed to fill out paper forms on any subject automatically.

Semi-Custom software is tailor-made to fit any form. It takes advantage of a printer's ability to move its print head to print anywhere on a piece of paper.

Semi-Custom software performs on the IBM Personal Computer and compatibles having at least 256K bytes of random-access memory and color graphics. A tailored software package to collect, upload and print data ranges from $1,000 to $9,000.

Semi-Custom Software, Suite 330, 6807 Brennon Lane, Chevy Chase, Md. 20815.

Anderson Jacobson, Inc. announced the **AJ Data-Safe**, a data security system.

The system secures both local files stored on tape, diskette or hard disk and network data transmission, including point-to-point and electronic mail services. It uses the Data Encryption Standard established by the National Bureau of Standards.

The price of a single AJ Data-Safe module is $495.

Anderson Jacobson, 521 Charcot Ave., San Jose, Calif. 95131.

■

Format Software GmbH introduced **Dmac III**, a programmable data base compatible with Ashton Tate's Dbase III for Apple Computer, Inc.'s Macintosh.

Dmac III allows applications written in Dbase III to be transferred to the Macintosh. It allows users to bring up to 2,000 memory variables and up to 2,000 fields per record with a maximum record size of 32K bytes.

Dmac III requires a Macintosh computer with a minimum of 512K bytes of random-access memory.

It is priced at $495.

Format Software, c/o Datalogica, Matrix Plaza, 1964 Westwood Blvd., Los Angeles, Calif. 90025.

■

Consulair Corp. has released **Consulair Mac C/Mac C Toolkit Version 4, Consulair Linker** and **Consulair Utilities**, products for Apple Computer, Inc.'s Macintosh.

Consulair Mac C, an enhanced version of the C compiler and support library, uses built-in interfaces with complete support of all read-only memory system calls. It is fully compatible with Apple's Macintosh 68000 Development System.

Consulair Linker is an optimizing linker and librarian for Consulair Mac C and the Macintosh 68000. It enables programmers to optimize the final stage of their development process by creating libraries of shared code and standard functions, according to vendor.

Consulair Utilities includes Supermake, a Make facility; Diff, a file comparison utility; Grep, a multiple file search utility; and MPA, a maximum performance analyzer, a company spokesman said.

Consulair Mac C, Consulair Linker and Consulair Utilities cost $425, $80 and $100, respectively.

Consulair, 140 Campo Drive, Portola Valley, Calif. 94025.

NOW WE CAN TALK

cLINE/cENGLISH™

Features & Benefits

- **cEnglish** is a fourth generation procedural language using English-like syntax.

  Easy to learn and use.
- **cEnglish** is a full programming language including the use of functions and arrays.

  Ability to develop any type of application.
- **cEnglish** programs are compiled into "C" source code.

  Fast "C" programs without "C" programming.
- **cEnglish** permits embedded "C" code.

  "C" language power for systems integration.
- **cEnglish** programs are 100% portable.

  No duplication of development effort.

Sample Program

```
IDENTIFICATIONS
  MODULE: Mininame
  AUTHOR: bcs
  DATE:   8/29/84
/* program that adds first name to a file
GLOBALS
  FIXED LENGTH 1 ans
  FIXED LENGTH 15 fname
END GLOBALS
MAIN PROGRAM
  BEGIN
    CLEAR SCREEN
    USE "NAMES"
    VIEW BY "ID_FNAME" ASCENDING
    STORE "?" TO ans
    AT 23,01 SAY "Add a record ?
    Enter Y or N "
    WAIT TO ans
    WHILE UPPERCASE(ans) EQ "Y"
      CLEAR GETS
      AT 06,01 SAY "Please enter first
      name"
      AT 06,20 GET fname
      READ 1
      STORE fname TO record_name
      APPEND RECORD
      AT 12,10 SAY "Welcome to
      cENGLISH " & fname
      AT 14,10 SAY "Press any key to
      continue. "
      WAIT
      STORE " " TO fname
      STORE "?" TO ans
      AT 23,01 SAY "Add another record
      Enter Y or N "
      WAIT TO ans
      CLEAR ROW 1 THRU 24
    END WHILE
    AT 12,10 SAY "Thats all for now !"
    UNUSE "NAMES"
END PROGRAM
```

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NEW PRODUCTS/MICROCOMPUTERS

Lang-Allan, Inc. announced **Bluestreak**, a terminal emulation package designed for the IBM family of Personal Computers.

Bluestreak supports two independent terminal emulations concurrently using COM1 and COM2. The software provides setup for 10 terminals, including Digital Equipment Corp.'s VT100, and operates at speeds up to 9.6K bit/sec.

Special-function key definition provides up to 16 characters for 30 special function keys. Bluestreak costs $52.95.

Lang-Allan, 2431 Aloma Ave., Winter Park, Fla. 32792.

■

Smart Software, Inc. has introduced an enhanced version of its **Smartforecasts** software for business forecasting, graphics and data analysis.

Smartforecasts II features tripled data capacity, 100% increase in computational speed, full IBM PC-DOS compatibility and expanded double expert system features.

Smartforecasts II runs on the IBM Personal Computer XT and AT with 38K bytes of random-access memory.

It costs $645 through March 15 and $795 after that date. Smartforecasts owners can upgrade to Smartforecasts II for $199 until March 15 and for $350 thereafter.

Smart Software, 392 Concord Ave., Belmont, Mass. 02178.

■

Sophco, Inc. has announced **Alpha**, a programming language designed for business data base applications.

Alpha works on a variety of operating systems: Microsoft Corp. MS-DOS and Xenix, IBM PC-DOS and PC/IX and AT&T Unix. It features its own compiler, its own editor with source code, the ability to read Ashton-Tate's Dbase II and III files directly, report and screen form generators and a manual.

Pricing for Alpha starts at $89 for the MS-DOS/PC-DOS version.

Sophco, P.O. Box 7430, Boulder, Colo. 80306.

■

Westminster Software, Inc. has released **Version 6** of its **Pertmaster** project management software.

Version 6 offers a zoom function enabling project managers to construct or edit any element of a critical path geographically, increased speed and graphics capabilities and the ability to jump directly between bar chart and editing modes.

Pertmaster runs on the IBM Personal Computer and compatibles, the Hewlett-Packard Co. Vectra and 150; AT&T PC 6300 and other 16-bit Microsoft Corp. MS-DOS 2 operating systems.

Pertmaster is priced at $695.

Westminster Software, 2570 El Camino Real, Mountain View, Calif. 94040.

■

Computer Information by Design, Inc. has announced **Friendly Data Manager**, a software program compatible with data bases created by Information Builders, Inc.'s PC/Focus.

The Friendly Data Manager is a full screen data maintenance facility for Focus data bases. It can be completely menu operated. When used in the expert mode, operation can be via the keyboard. Screen layouts can be automatically generated or custom designed.

The product is priced at $295.

Computer Information by Design, Suite 411, 2444 Wilshire Blvd., Santa Monica, Calif. 90403.

■

Computer Utilization Services Corp. has introduced **Xref**, a concordance software tool for Basic programmers, and **Xasm**, a universal 8-bit cross-assembler.

Xref is a cross-reference generating program for Basic source program files. It generates a sorted itemized list of all the literals, line numbers and symbols used in a program along with the line numbers referencing them. It costs $49.

Xasm is a two-pass cross-assembler that accepts text-editor-compatible source and creates an Intel Corp. hexidecimal format object file and a listing file. It costs $225.

Both programs operate on an IBM Personal Computer-compatible with 64K bytes of memory, a single disk drive and Microsoft Corp. MS-DOS or IBM PC-DOS.

Computer Utilization Services, 1620 S. 21 St., Birmingham, Ala. 35205.

■

Aldebaran Laboratories, Inc. has introduced **Source Print**, a software utility for data base and computer programming that runs on the IBM Personal Computer, Personal Computer XT, AT or compatibles.

Source Print uses one-line commands to format printouts of source code in C, Pascal, Basic and Ashton-Tate's Dbase II and III. It features structure outlining and source library maintenance.

Source Print costs $97.

Aldebaran Laboratories, Building 312, 3738 Mount Diablo Blvd., Lafayette, Calif. 94549.

■

Mega Cadd, Inc. has announced **Design Board Illustrator**, a personal computer-based graphics software package.

The software allows users to produce animated sequences and add color, shading, free-hand sketching

Continued on page 94

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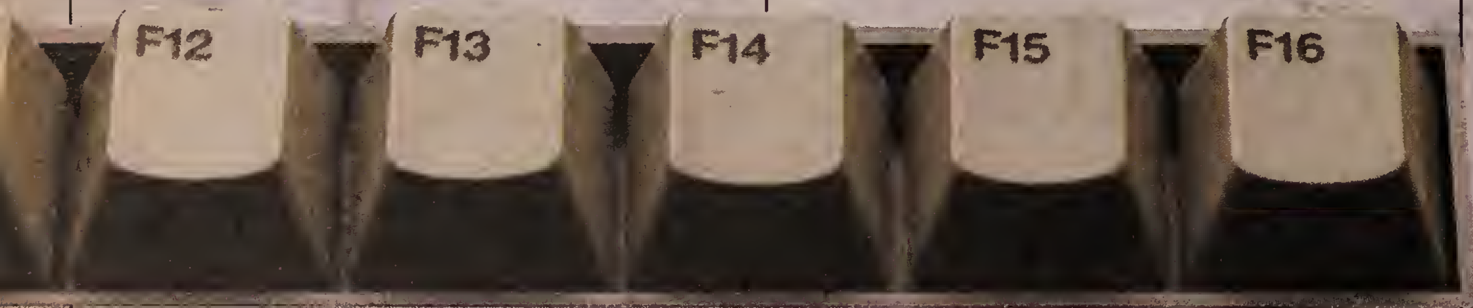

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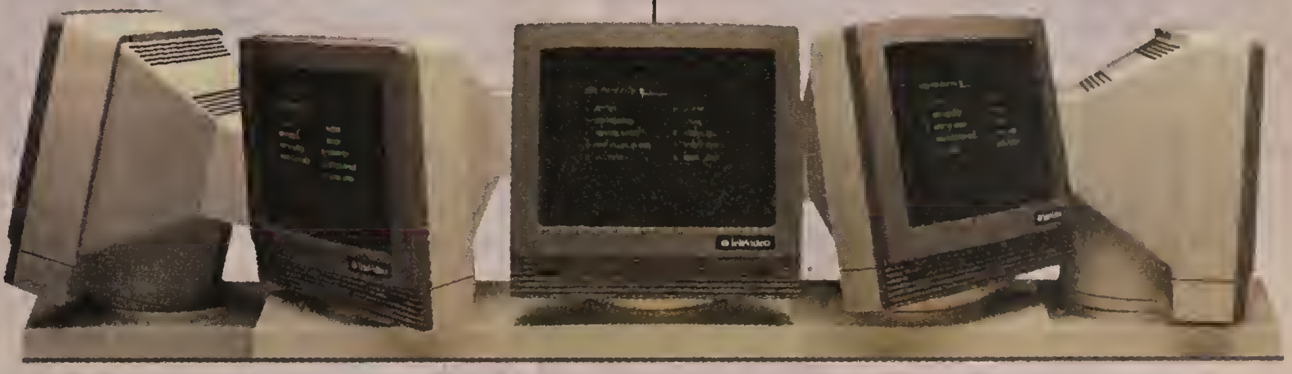

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FEATURES	TELEVIDEO 905	WYSE WY-30
ENHANCED NUMERIC KEYPAD	YES	NO
PROGRAMMABLE FUNCTION KEYS	16	4
TILT AND SWIVEL	YES	NO
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NEW PRODUCTS/MICROCOMPUTERS

Continued from page 90

and text to computer-generated drawings. The illustrator supports from four to 256 colors.

Design Board Illustrator costs $395. It requires an IBM-compatible personal computer with 256K bytes of memory.

Mega Cadd, 401 Second Ave. S., Seattle, Wash. 98104.

■

Reynwood Software Systems has announced **Selex-Sys**, a computer-based interview system designed to help organizations meet staffing requirements.

Selex-Sys allows users to plan for an interview and analyze a candidate's qualifications after the interview.

Selex-Sys runs on the IBM Personal Computer, Personal Computer XT or compatibles. It requires Microsoft Corp. MS-DOS or IBM PC-DOS 1 or higher and 128K bytes of memory.

Three-year license fees range from $450 for one location to $320 each for or more locations.

Reynwood Software Systems, 6 Landmark Sq., Stamford, Conn. 06901.

■

Wordcraft has introduced **C: A Programming Workshop**, an interactive workshop in the C programming language.

The workshop includes an integrated editor and standard compiler. Topic coverage ranges from the fundamentals of structured software to linked lists and assembly language interfacing. The test module reports whether a program exercise gives correct results. The user may develop his own C functions with no disk delay.

The workshop runs on the IBM family of personal computers with 192K bytes of memory. It is priced at $39.95.

Wordcraft, 3827 Penniman Ave., Oakland, Calif. 94619.

■

Gulf Publishing Co. has announced **Econocalc: Project and Venture Economics and Analysis**, a spreadsheet program designed to run on the IBM Personal Computer, Personal Computer XT, AT or Apple Computer, Inc.'s Apple IIc and IIe.

Econocalc covers financial analysis, engineering economics, cost control, plant design, operation optimization, expansion studies and long-range planning. It calculates interest, debt payment, impact of inflation, inventory changes, profit before and after tax and federal income tax. It diagrams up to 40 years, 32 quarters or 36 months of operating life and can deflate the entire spreadsheet to present dollars.

Econocalc is available for $550.

Gulf Publishing, Dept. J4, P.O. Box 2608, Houston, Texas 77001.

■

Dynamical Systems, Inc. has announced **AT Speedfixer**, a software utility for the IBM Personal Computer AT.

AT Speedfixer offers a memory-resident disk utility that prevents the floppy disk drive errors that occur on an AT running faster than 6 MHz, a keyboard utility that increases the speed of the keyboard and instructions on replacing the AT's crystal to speed up the AT.

AT Speedfixer is priced at $24.95.

Dynamical Systems, 2511 Fulton St., Berkeley, Calif. 94704.

■

Budget Computer, Inc. has released **Version 2** of its **Mi-Amor** loan amortization package for the IBM Personal Computer family.

Version 2 computations are said to be six times faster than the previous release. Payment periods have been expanded to handle from one to 52 payments per year.

The upgrade is free to registered users who purchased Mi-Amor after Sept. 1. Others must pay a $10 fee. Mi-Amor costs $89.95.

Budget Computer, 160 S. Second St., Milwaukee, Wis. 53204.

■

Irwin Magnetics has introduced **Level 4** software for use with its Backup tape drives.

When a disk's full image is copied to tape, Level 4 software reorganizes fragmented files before writing them back to the disk. Level 4 software also provides error correction code on 20M-byte tape drives, backing up only those files that have been modified.

Level 4 costs $49.95.

Irwin Magentics, 2311 Green Road, Ann Arbor, Mich. 48105.

■

TSI International has announced the **PC Option** for its Key/Master data entry system.

The PC Option allows data to be keyed at the user department or central data entry; operation, verification and edit checks are performed right on the personal computer. The data can then be uploaded to Key/

Continued on page 96

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The Tandy 3000 uses the advanced MS-DOS 3.1 operating system. And since the Tandy 3000 is compatible with programs designed for the PC/AT, as well as the PC/XT, it cuts through today's software confusion. Choose from thousands of powerful applications.

The Tandy 3000 is designed to use the forthcoming XENIX 5.0 multiuser operating system. Two to six people can use the 3000 simultaneously with low-cost data terminals. The Tandy 3000 is network ready, too.

The Tandy 3000 (25-4001, $2599) operates at twice the speed of the industry standard, has 512K of main memory (expandable to 640K on the main board), a high-capacity floppy disk drive and a serial/parallel adapter. Expands easily with ten expansion slots, too.

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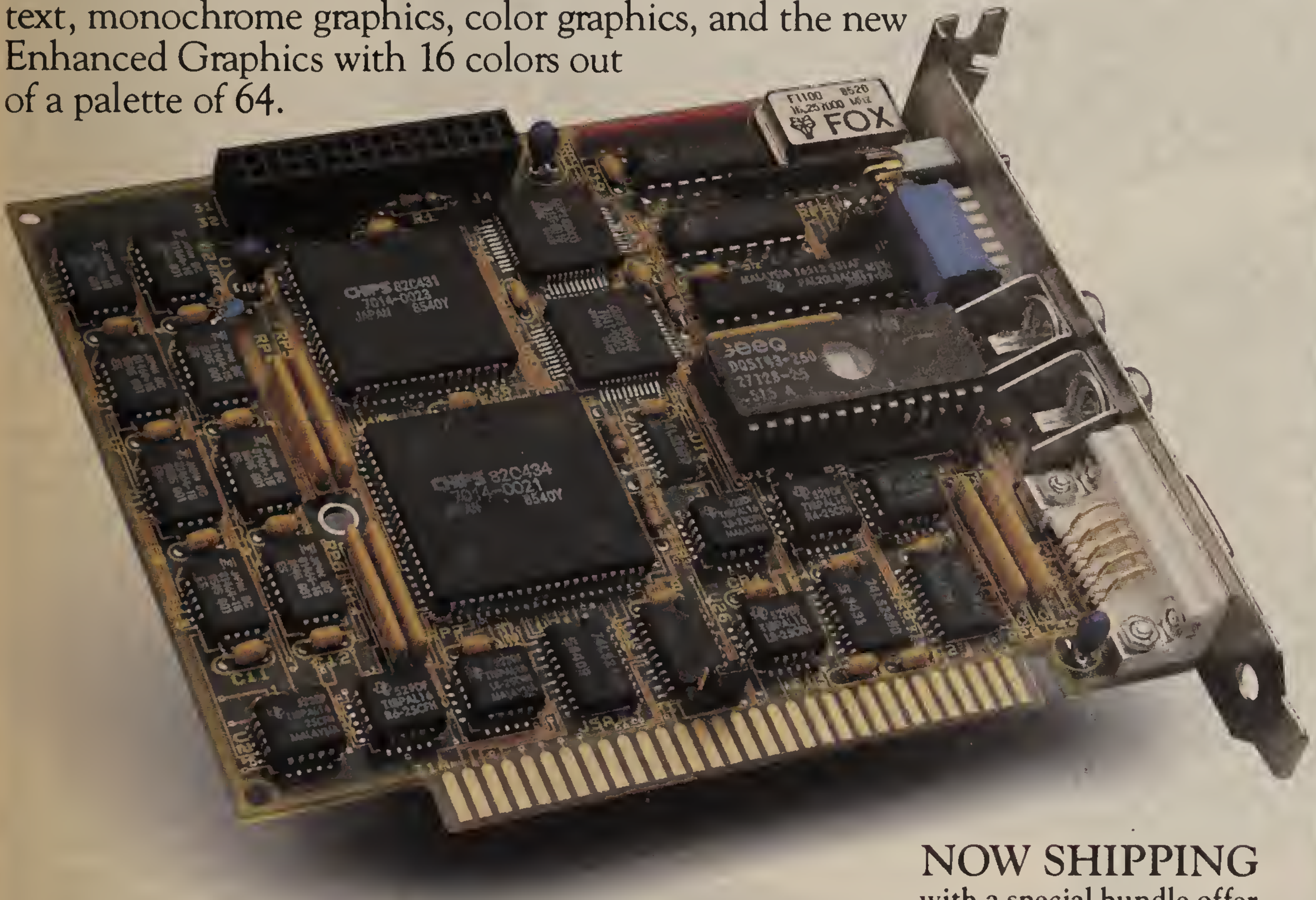

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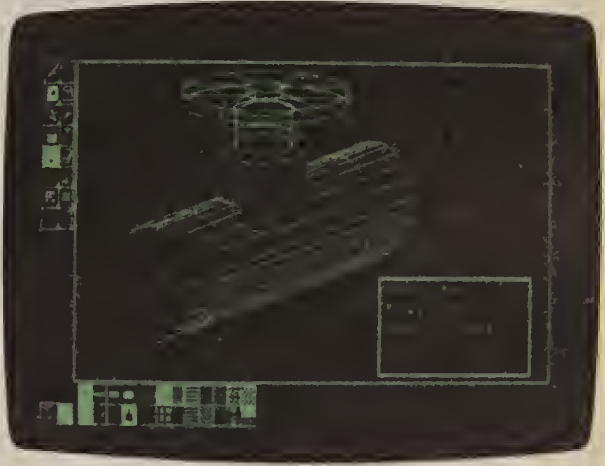

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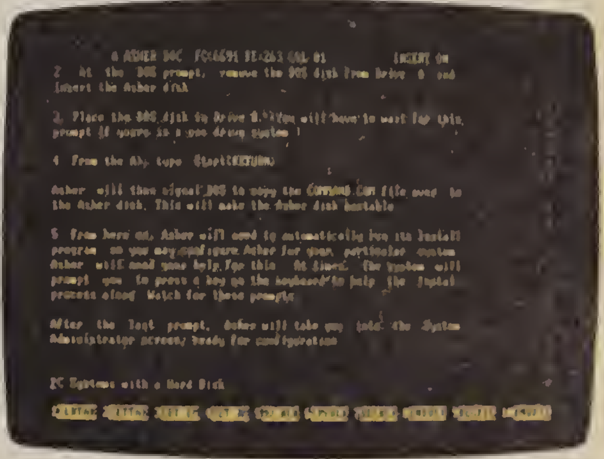

640 x 350

Continued from page 94

Master on the mainframe for further checks or cross-loaded to existing personal computer software.

At least one personal computer with a Digital Communications Associates, Inc.'s Irma communications board is required per system.

PC Option is priced at between $12,000 and $15,000, the vendor said.

TSI International, 295 Westport Ave., Norwalk, Conn. 06856.

Aegis Development, Inc. is marketing animation, paint and executive presentation **graphics software** developed by Commodore International Ltd. and Island Graphics Corp. for the Commodore Amiga computer.

Aegis Animator is a real-time animation program that is packaged with Aegis Images, a paint system that provides up to 640- by 200-pixel resolution and, according to the vendor, displays a maximum of 32 out of a possible 4,096 colors at one time.

A third package, Impact, can produce charts, graphs, plots and presentation slides in three dimensions, the vendor said. A built-in slide show lets users assemble and play back slides.

The combined animation/paint system costs less than $140, and Image retails for less than $200, a spokesman said.

Aegis Development, #277, 2210 Wilshire Blvd., Santa Monica, Calif. 90403.

Ideassociates, Inc. has enhanced its **Ideacomm 5251** twin-axial emulator for linking IBM Personal Computers, Personal Computer XTs and ATs to IBM System/34, 36 and 38 minicomputers.

Ideacomm 5251 now supports such IBM file transfer programs as File Support Utility, File Transfer Facility, PC Support/36 and PC Support/38.

The upgraded product offers emulation for the IBM 5219 letter-quality printer and IBM System/34, 36 and 38 computers. The Ideacomm 5251 card and software retails for $895, the vendor said.

Ideassociates, 35 Dunham Road, Billerica, Mass. 01821.

■

Release 2 of **Statpro**, the statistics and graphics data base manager from **Penton Software, Inc.**, runs under Microsoft Corp. MS-DOS or IBM PC-DOS on IBM Personal Computers, Personal Computer XTs, ATs and compatibles.

Enhancements include color, use of function keys and a cross-tabulation module that offers a way to present and analyze multiple factor data in multidimensional tables.

A data transfer utility lets users exchange data between Statpro and other formats including ASCII files and Ashton-Tate Dbase II and III.

Menu-driven Statpro 2 sells for $795.

Penton Software, Suite 2846, 420 Lexington Ave., New York, N.Y. 10017.

■

Application Executive Corp. has released **Version 2.2** of its **APX Core Executive** software integration package that creates a multitasking windowing environment under IBM's PC-DOS.

APX Core 2.2 is compatible with programs modified to use IBM's Topview window and concurrent processing capabilities.

APX Core 2.2 runs on IBM's family of Personal Computers and compatibles having one double-sided floppy disk drive, 128K bytes of memory and IBM PC-DOS up to Version 3.1. The package sells for $95. APX Core 2.1 users can upgrade for $25.

Application Executive, Suite 4C, 600 Broadway, New York, N.Y. 10012.

■

Micrun/CPM, a package that allows Digital Research, Inc. CP/M 80 software to run on IBM and compatible computers that use Microsoft Corp. MS-DOS or IBM PC-DOS Version 2.1 or higher, has debuted from **Micro Interfaces Corp.**

The software interface works with the NEC Corp. V-20 microprocessor chip,

Continued on page 99

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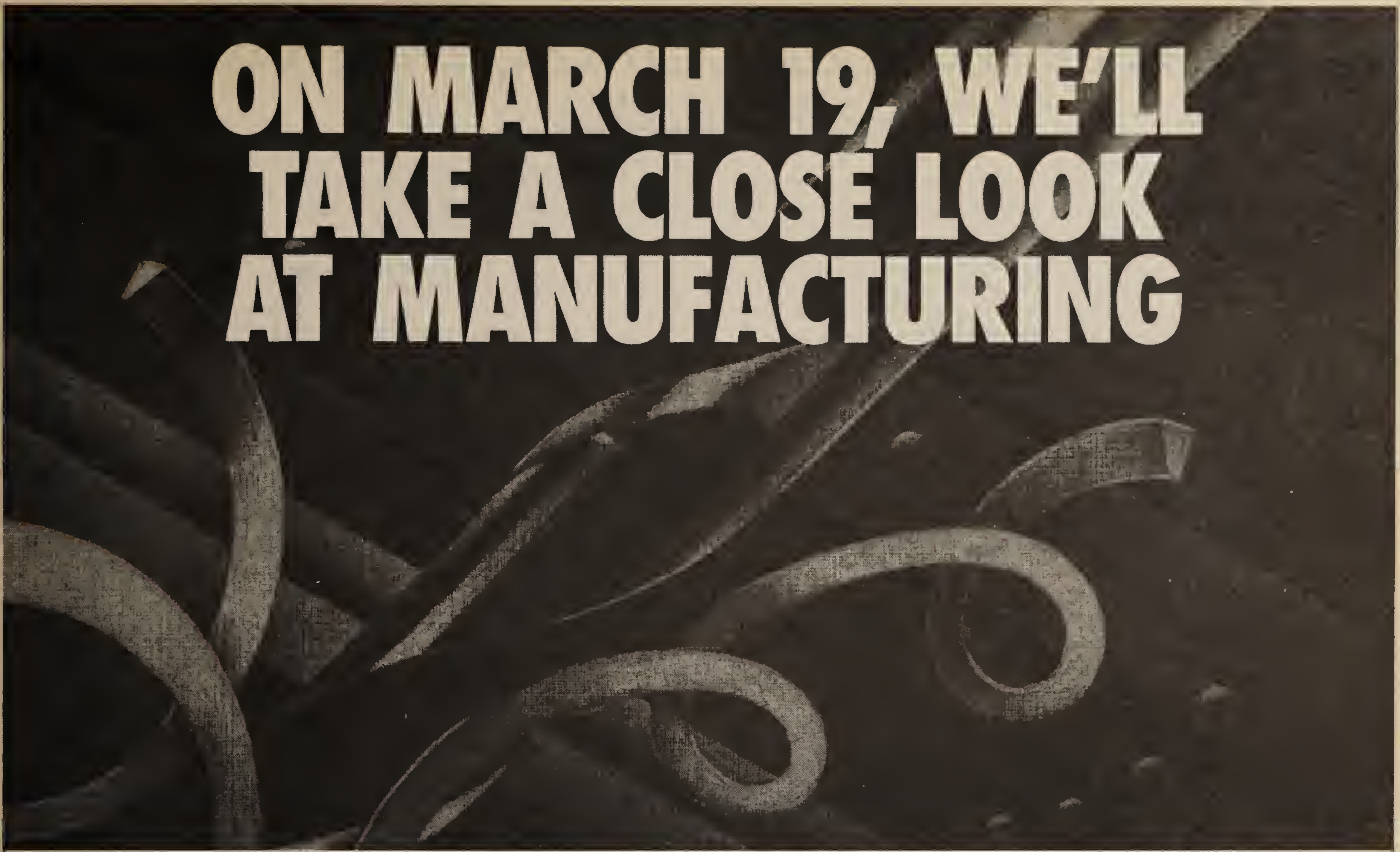

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Ultimately, computers will extend to every department in every company. And when they reach the factory floor, the MIS/DP department will be called in to help with the decisions.

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NEW PRODUCTS/MICROCOMPUTERS

Continued from page 96

which provides 8-bit processing power. Commands issued by Micrun/CPM will automatically switch the microprocessor from 16-bit mode to 8-bit mode for executing CP/M 80 software Versions 2.2 or lower.

A disk-to-disk transfer utility allows the computer to read, write and format up to 70 CP/M and MS-DOS disks without requiring modems or RS-232 links. Micrun/CPM, including the V-20 chip, costs $145.

Micro Interfaces, 6824 N.W. 169th St., Miami, Fla. 33015.

■

Plaza Software has announced **Jet Set**, a program for IBM Personal Computers and compatibles that reportedly helps users configure Hewlett-Packard Co. Laserjet printers.

The software substitutes graphics menu selections for the escape sequence strings required by the printer for selecting parameters.

It costs $99.95.

Plaza Software, Suite E-105, 1380 Garnet Ave., San Diego, Calif. 92109.

■

Bottomline-V, a financial decision support system for business planning, "what-if" analysis, budgeting and corporate financial simulation is available from **Ilar Systems, Inc.** for Lotus Development Corp.'s Jazz.

The system consists of four modules: a historical financial analysis; 12-month sales forecast, budget and cash flow; a quarterly forecasting model; and a five-year forecasting model plus quarterly and five-year budget projections.

Bottomline-V sells for $395.

Ilar Systems, Suite 105, 1300 Dove St., Newport Beach, Calif. 92660.

■

Macropik'r, a data reformatter, has bowed from **Samkhya Corp.**

Macropik'r lets users select, edit and convert information gathered from outside systems into the file format of IBM Personal Computer or compatible application software. Data may be downloaded from corporate reports, mainframes, minicomputers, bulletin boards, public data bases, time-sharing services or laboratory instruments.

Macropik'r requires IBM PC-DOS Version 2 or higher and at least 256K bytes of memory. The single quantity price is $249.

Samkhya, P.O. Box 142, Suite 3000, 47 Sixth St., Petaluma, Calif. 94953.

■

Sumware, Inc. has unwrapped **Sum:Time**, an electronic desktop package for the IBM family of Personal Computers and compatibles.

The software offers such applications as a time management calendar, indexed filing, data base management and letter writer.

Sum:Time is disk based and can be used with a mouse or keyboard cursor keys. It is also compatible with other personal computer applications programs including IBM Topview and Microsoft Corp. Word.

Priced at $89.95, the package requires at least 192K bytes of memory.

Sumware, 23121 Verdugo Drive, Laguna Hills, Calif. 92653.

■

Abra 2000, a computerized resource system for small to medium-size companies employing between 25 and 2,000 individuals is available from **Abra Cadabra Software**.

The package runs under Microsoft Corp. MS-DOS on the AT&T PC 6300 and IBM Personal Computer or compatibles.

It handles personnel record keeping, equal employment opportunity benefits and salary analysis and salary review reporting needs.

Over 21 reports are supplied in four categories: personnel, job/salary, affirmative action and benefits.

Abra 2000 data files are compatible with Ashton-Tate's Dbase III. Users can query the data base and create reports. Abra 2000 can store up to 125 data elements per employee.

The package sells for $995.

Abra Cadabra Software, 111 Worcester Lane, Los Gatos, Calif. 95030.

■

Updclk, a program that reads the clock/calendars on AST Research, Inc. and Quadram Co. multifunction boards plus displays and stores the date and time in Microsoft Corp. MS-DOS and IBM PC-DOS has bowed from **Drastech Solutions**.

If the boards are missing or if they contain erroneous date and time values, Updclk displays a message and sets an MS-DOS or PC-DOS error level code so an Autoexec bat file can be written to prompt for date and time.

Individual licenses for unlimited use are priced at $795 per personal computer support group or computer reseller.

Drastech Solutions, 2550 Holland Ave., Bronx, N.Y. 10467.

■

CDI Systems, Inc. announced **CDI/FTS**, a microcomputer-to-mainframe package for the IBM family of Personal Computers and compatibles that supports TSO, CMS, CICS and IBM host transfer program products.

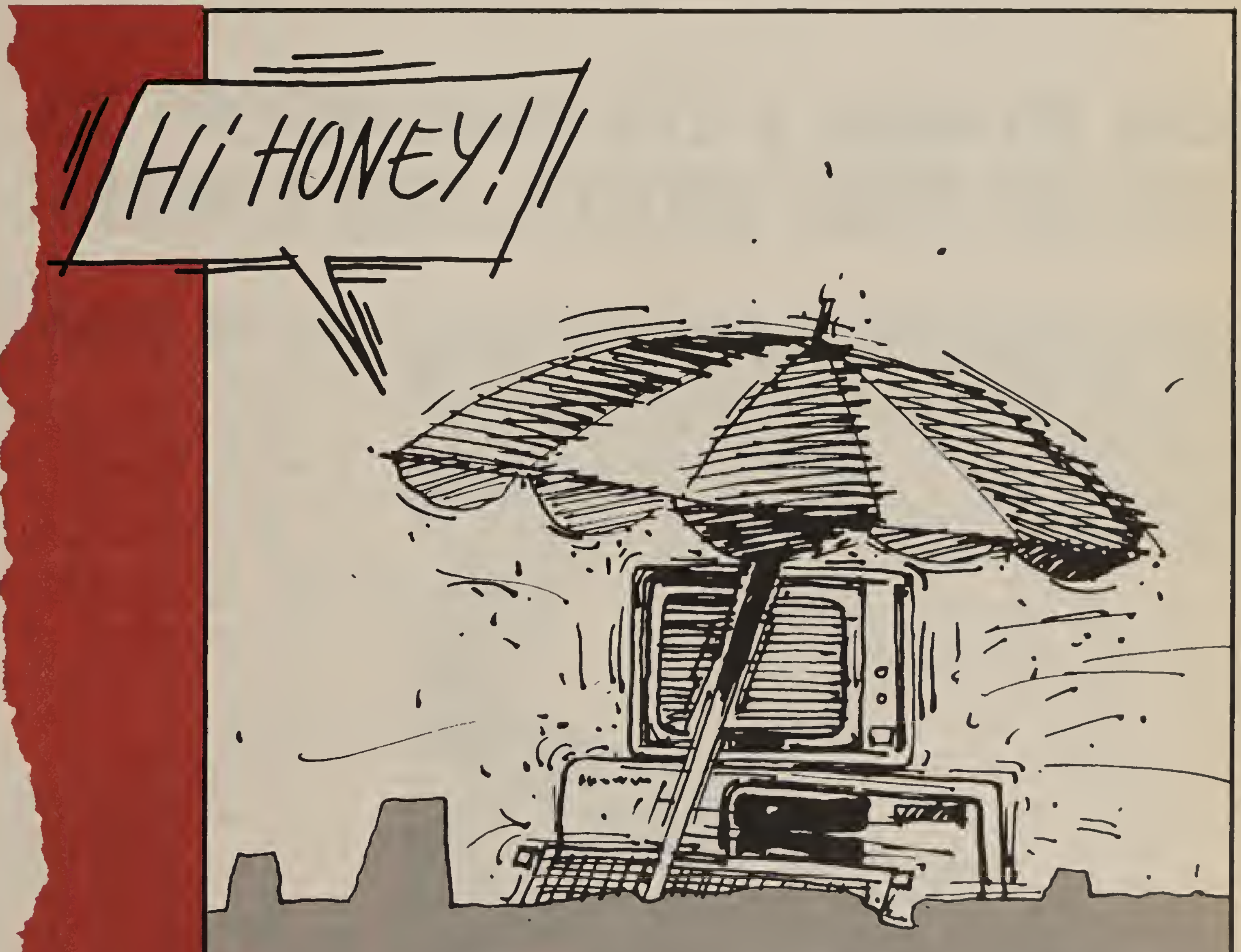
The package connects to the mainframe through IBM 3270 emulation hardware. The software interfaces with CICS in any IBM mainframe operating system environment via IBM mainframe file transfer program products.

With CDI/FTS, users can transfer files consisting of printable and nonprintable characters.

CDI/FTS requires 128K bytes of memory, two disk drives or a hard disk, a 3270 emulation board and IBM PC-DOS Version 2 or higher.

CDI/FTS costs $129.

CDI Systems, 2803 Butterfield, Oak Brook, Ill. 60521.



HoneyBunch.
Honeywell VIP synchronous emulation and file transfer (FTF included).
Compatible with Topview and IBM PC Local Network.
Honeywell VIP asynchronous emulation and file transfer.
Compatible with Topview and IBM PC Local Network.
WriteMate option to download into Personal Assistant (PFS) file formats: 49 $.

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IBM PC and Topview are trademarks of International Business Machines Corp.
PFS is a trademark of Software Arts.

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TDT Inc., Rivergate Plaza, 444
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Connections IBM PC – Honeywell mainframe

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Payment VISA MC BankDraft Check
Credit card Exp Date /
Card Nb

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Shipping Address
City
State Zip
Telephone
Company

Cadcom-64, a computer-aided design package for the Commodore Business Machines, Inc. Commodore 64 computer is available from **1st CAD**.

The package lets users specify up to 9- by 12.8-in. printed-circuit board designs with room for alphanumerics in the border area or on the finished printed-circuit board.

With Cadcom-64, users can draw multilayer designs by automatically testing and setting pads between layers, display a coordinate system on the screen, place photographic targets and title blocks anywhere on the drawing and make one-to-one check prints and two-to-one prototype production-quality print plots on supported dot matrix printers.

Cadcom-64 costs $395.

1st CAD, P.O. Box 261282, Denver, Colo. 80226.

Softronics, Inc. has enhanced **Softerm PC**, its communications and terminal emulation software for IBM Personal Computers and compatibles.

A memory-resident file agent that functions as a file server to the application program has been added, providing integration of file transfer with an application running under IBM PC-DOS.

Softerm PC is priced at $195.

Softronics, Suite 210, 7899 Lexington Drive, Colorado Springs, Colo. 80918.

■

Stilwell Software Products is offering **Freeword**, a menu-driven word processor for the IBM Personal Computer.

Freeword supports cursor movement by character, word, line, screen or page plus block delete, move and copy text functions. Other features include forward and backward search and replace, right margin justification and background printing of up to nine copies of a document.

Freeword costs $49 per copy.

Stilwell Software Products, 16403 N. 43rd Drive, Glendale, Ariz. 85306.

■

Goldata Computer Services, Inc. has enhanced **Goldatabase** to be compatible with Novell, Inc. Netware System Fault Tolerant software.

Other Version 6 enhancements include user-designed menus, cross-dictionary data base access plus local-area networking compatible with record locking and file locking for multiple users who access a common data base simultaneously.

A single-user license costs $595, while local-area network version prices vary according to the number of concurrent users. Users can upgrade to the new version from Version 5 for $50.

Goldata Computer Services, 2 Bryn Mawr Ave., Bryn Mawr, Pa. 19010.

■

Monte Carlo simulation was added to **Version 3** of **Ferox Microsystems, Inc.'s Encore**, a financial modeling and graphics package for the IBM family of Personal Computers and compatibles running Microsoft Corp. MS-DOS 2 or higher.

Used to evaluate risk and uncertainty in capital investments or ongoing operations, Monte Carlo simulation allows key assumptions to be specified randomly.

Other enhancements include an ability to read and write Lotus Development Corp. 1-2-3 or Symphony spreadsheet files directly.

Version 3 is available at no charge to current Encore users. The package sells for $895.

Ferox Microsystems, Suite 1205, 1701 N. Fort Myer Drive, Arlington, Va. 22209.

■

SAS/Rterm, software that emulates the Digital Equipment Corp. VT100 terminal and Tektronix, Inc. 4100 series graphics commands has bowed from **SAS Institute, Inc.**

The remote communications package produces high-resolution, hardcopy graphics with IBM Personal Computers, Personal Computer XTs, ATs, 3270 Personal Computers and compatibles.

SAS/Rterm first-year site licenses cost $1,500 for corporate users with one to 50 workstations.

SAS Institute, Box 8000, SAS Circle, Cary, N.C. 27511.

Systems

Esprit Systems, Inc. has announced the **Series 20** line of microcomputers that either function as stand-alones or support up to three users.

The two models, the X-20 and B-20, come with a 20M-byte Winchester disk; 360K-byte floppy drive and Microsoft Corp. MS-DOS, according to the vendor.

The SMC Software Systems Co. Thoroughbred operating system is standard for the B-20 and Microsoft's Xenix is standard for the X-20.

Either system can connect to the Esprit X-16 multiuser supermicrocomputer that accommodates up to 12 users and has 105M bytes of hard disk storage.

Each model sells for $4,995.

Esprit Systems, 100 Marcus Drive, Melville, N.Y. 11747.

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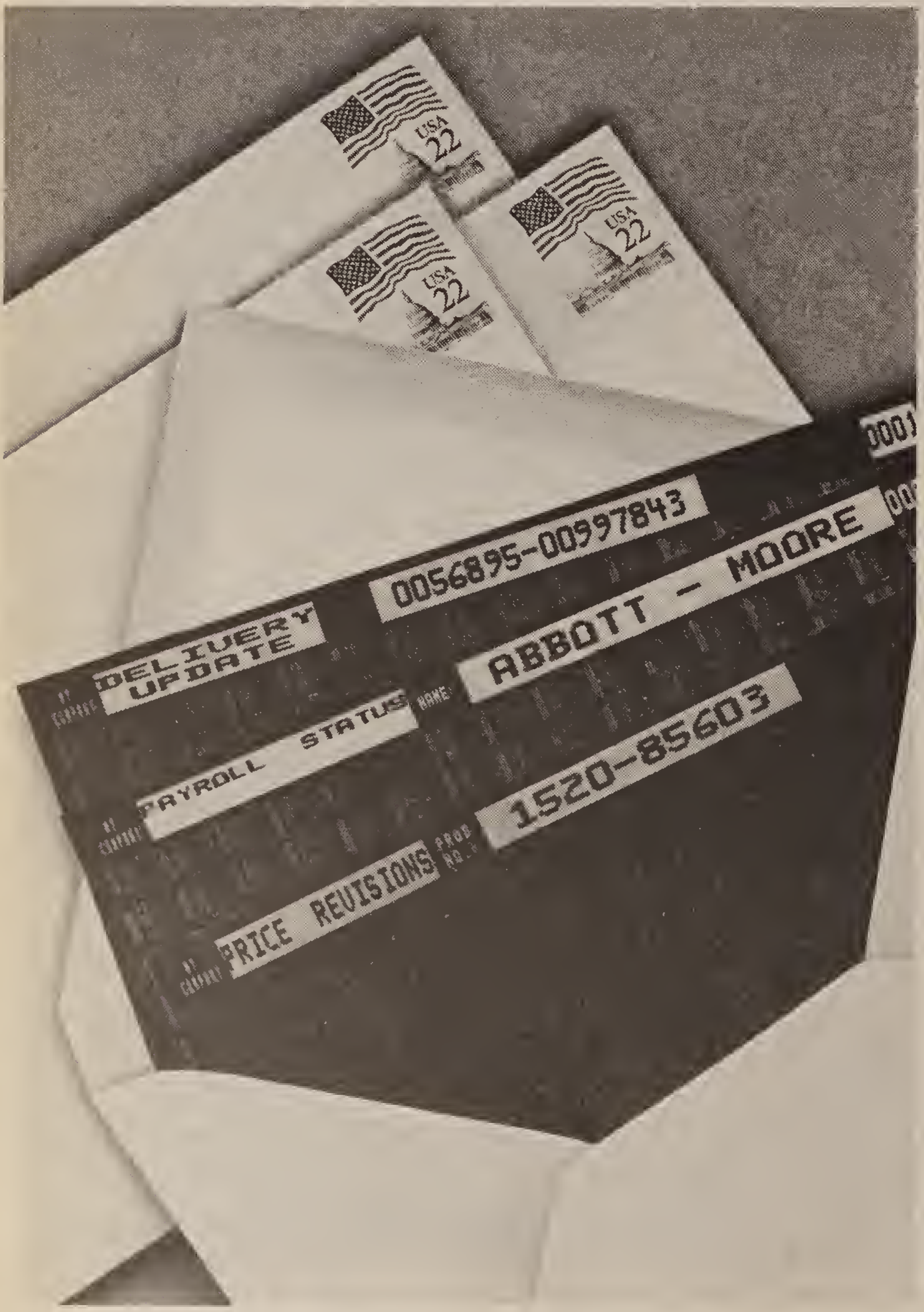

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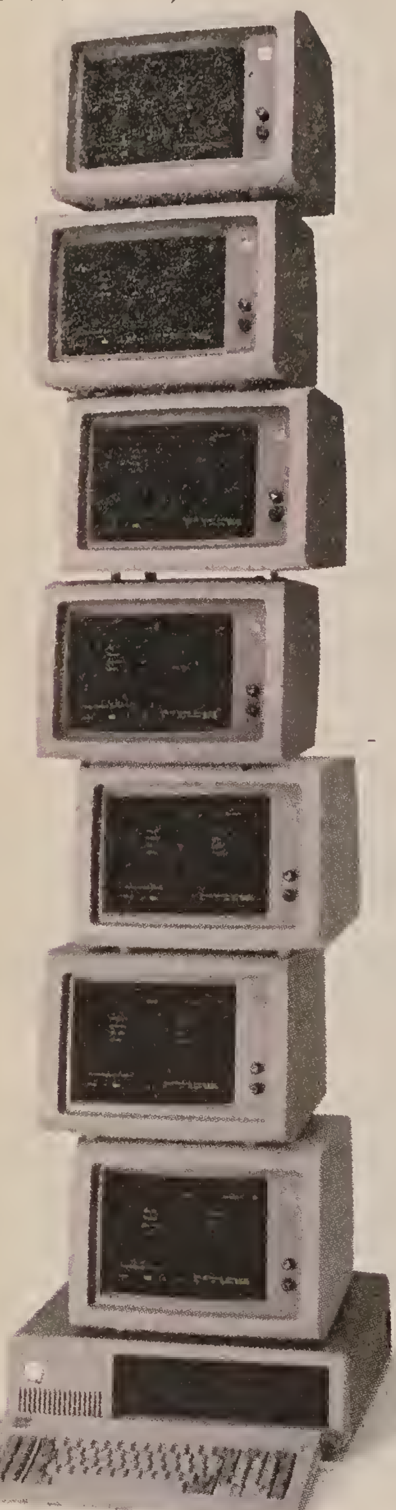

Multiple Host Sessions—Up To 7 Combinations of Displays and Printers—Simultaneously (Available Only On AST-5251/11 Plus)

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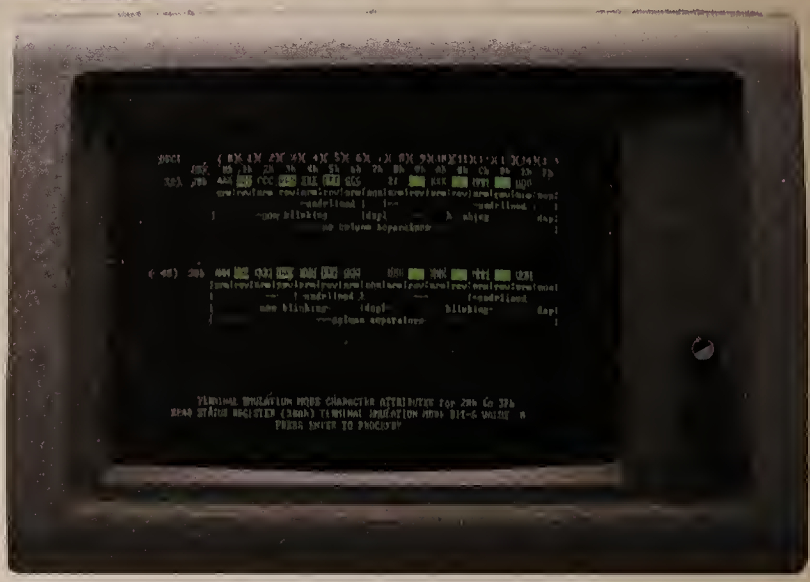
Bidirectional File Transfer

Automatic Sign-On With Password Security



Display Attribute Configuration

Build Your Smart Office The Smart Connection™ For

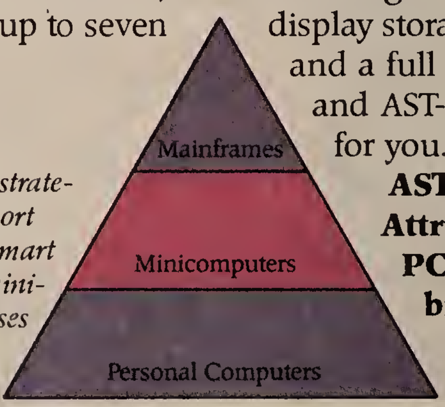
Now! Compatible With IBM® PC Support/36 Watch For Support/38

Loaded with the sophisticated features you need, we've just made our original AST-5251/11 even easier to use and more efficient for increased user productivity, and introduced an enhanced version too—AST-5251/11 Plus.™ Now you have lots of new reasons to make AST "The Smart Connection" for your evolving smart office.

Office Smarts—We've Got Them. At AST we've been building solutions for IBM® PC connectivity—the foundations of smart offices everywhere—long before it was a popular concept. You might say, with the over one million AST PC enhancements installed, over 20,000 PC to System 34/36/38 connections and the thousands and thousands of PC to IBM mainframe and local area network gateway connections we've established worldwide, that we've already made a substantial commitment to helping people realize their fundamental visions of the "smart office."

AST-5251/11—The Direct PC To 34/36/38 Connection. Standard twinax cable, just like IBM's, makes this connection the most convenient for you. Our Hot-Key support provides a toggle between PC DOS and two host sessions. And our new enhanced version, AST-5251/11 Plus, even allows up to seven System 34/36/38 sessions—all concurrently.

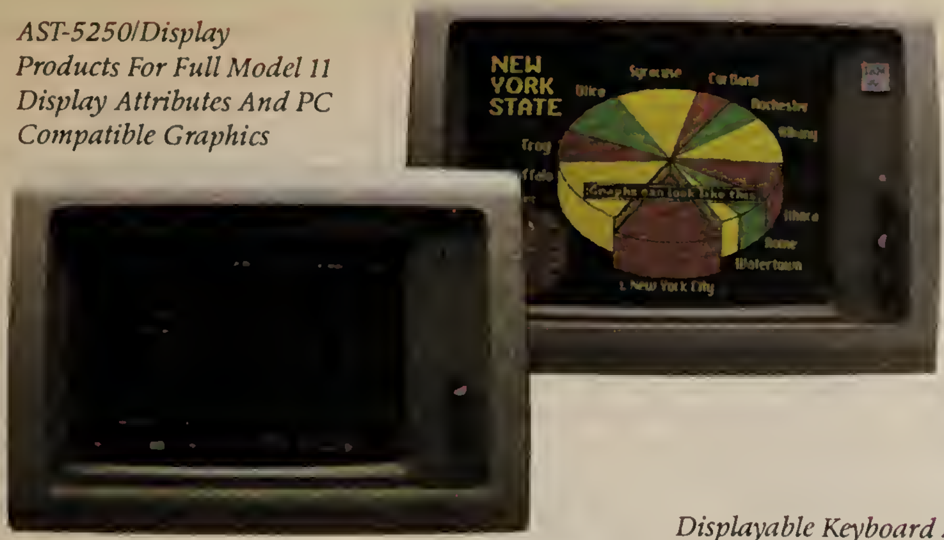
AST's family of smart connections are strategically focused and developed to support and evolve in concert with the IBM Smart Office architecture. Highlighting the minicomputer group here, AST also addresses connectivity in mainframe and personal workstation environments.



Our file transfer system means you can move host data to and from your favorite PC application software files, like Lotus 1-2-3,® WordStar® and dBASE.™ For easy integration of PC and host applications, we've included our Applications Program Interface (API).

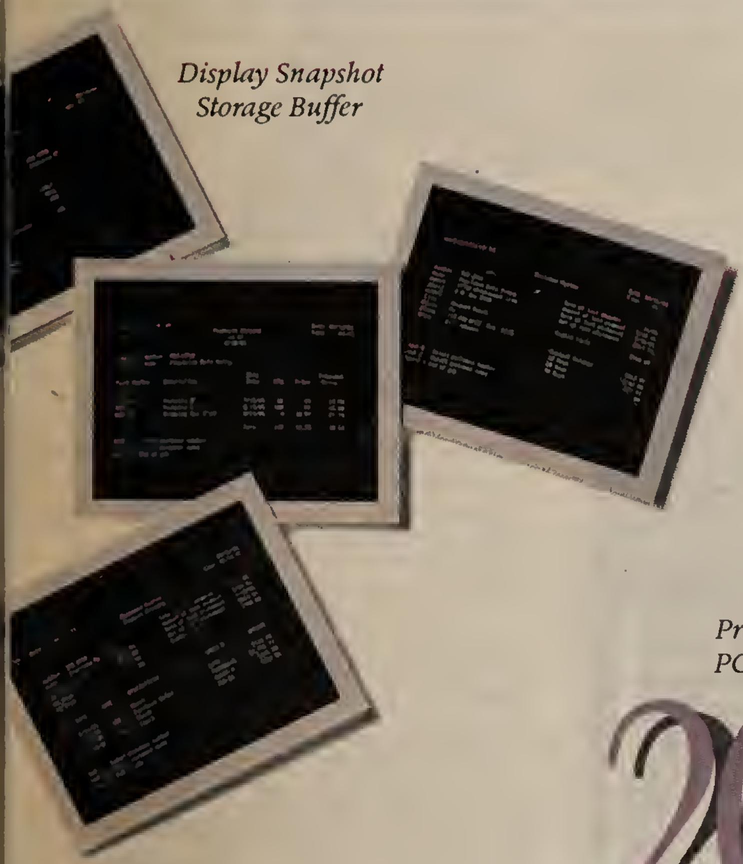
Add all our features illustrated above—everything from bidirectional file transfer to automatic 34/36/38 sign-on with password security, multiple printer support including 5256, 5224 and 5225, snapshot display storage, keyboard mapping help, and a full line of companion products—and AST-5251/11 really spells smart for you.

AST-5250/Display™—Model 11 Attributes and Standard IBM PC Monochrome Display Capabilities. Used with your AST-5251/11 card, the AST-5250/Display makes your PC's



AST-5250/Display Products For Full Model 11 Display Attributes And PC Compatible Graphics

User Definable Keyboard Mapping



Display Snapshot Storage Buffer

Displayable Keyboard Map of Program Control Keys

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AST-5250/Display

- Used with AST-5251/11 brings full IBM 5251 Model 11 character and text display attributes to your IBM monochrome display
- Provides standard IBM PC & IBM 5251/11 monochrome display capabilities & a parallel printer port
- Hercules compatible high-res bit-mapped graphics interface
- Automatically switches from 5251/11 display to PC display mode without operator interaction

AST-5250/Display-C

- Used with AST-5251/11 brings IBM 5292 Model 1 display attributes to your PC's color display
- Provides compatibility with IBM PC Color Graphics Adaptor with full-spectrum color capabilities
- Includes parallel port
- Automatically switches from 5292 Model 1 display to PC display mode without operator interaction

AST-5251/12

- A total solution for remote PC/XT/AT/Portable or compatible to System 34/36/38 communications in SNA environments
- PC emulation for IBM 5251 Model 12 terminal
- Host-addressable 5256 printer support on PC-attached printer
- Applications Program Interface (API) allows integration between host and PC applications
- Includes hardware, software and comprehensive user documentation

On AST-5251/11™: Your PC to System 34/36/38

monochrome display look just like an IBM Model 11 display.

And it gives you high-resolution Hercules™ compatible bit-mapped graphics, high quality text and a parallel port.

Now PC 5251/11 emulation is even easier for you because you're working with a screen identical to IBM's. And you can take advantage of the graphics capabilities offered by today's software.

AST-5250/Display-C™—IBM 5292 Color Attributes and Standard IBM PC Color Graphics Too. Use this card with your AST-5251/11 and your IBM color monitor for all of IBM's 5292 screen text attributes. And some really colorful PC graphics.

Our color capabilities are completely compatible with your PC software favorites like Framework,™ Symphony,™ Lotus 1-2-3,® Business Graphics Systems™ and DESQview.™ There's also a parallel port to make printer and plotter connection easy and convenient.

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NEW PRODUCTS/MICROCOMPUTERS

Communications

ITT has announced the **1200 PC** family of Hayes Microcomputer Products, Inc. Smartmodem 1200-compatible modems.

There are three configurations: the 1200 PC, a tabletop model; the 1200 SPC, a printed-circuit board; and the 1200 Security Modem. All three operate at 110, 300 or 1,200 bit/sec., and all offer automatic dialing of up to 16 numbers.

The 1200 PC handles both synchronous and asynchronous operations. The half-slot card version functions in asynchronous mode only. The 1200 Security Modem responds to calls by requesting a password.

The units operate with personal computers equipped with an RS-232C interface.

The 1200 PC costs $399, the 1200 SPC costs $429, and the 1200 Security Modem costs $569.

ITT, 20 Mayfield Ave., Edison, N.J. 08837.

■

Hilgraeve, Inc. has announced **Hyperaccess**, a communications software program for IBM Personal Computers or compatibles.

Hyperaccess allows communications with other computers via either modems or cable. It uses any auto-dial, acoustic-coupled or direct-connect modem. It allows the computer to act as an unattended host.

Hyperaccess is available for IBM PC-DOS or Microsoft Corp. MS-DOS.

It costs $149.

Hilgraeve, P.O. Box 941, Monroe, Mich. 48161.

Network Software Associates, Inc. has added an **Automatic Call Control facility** (ACC) to its AdaptSNA Remote Job Entry (RJE) micro-to-mainframe link for IBM Personal Computers, Personal Computer XTs, ATs and compatibles.

ACC gives micro users automatic dialing and call control functions for RJE mainframe session management. Users can set up a directory with up to 180 entries. AdaptSNA RJE can automatically call each entry, establish the RJE session, submit jobs and transfer files unattended.

An Adaptmodem board provides AT&T 201 compatibility, synchronous communications speeds up to 2,400 bit/sec. and on-board IBM Synchronous Data Link Control interface circuitry.

AdaptSNA RJE including Adaptmodem and ACC is priced at $1,380.

Network Software Associates, 22982 Mill Creek, Laguna Hills, Calif. 92653.

■

Quadram Co. has announced the **Quad3270 Gateway XLU**, a hardware and software product that supports communications between local-area-network-based personal computers and mainframe hosts.

The XLU enables a personal computer to emulate IBM 3278 Model 2 and 3279 two- and four-color terminals in order to communicate with IBM Systems Network Architecture mainframes. Up to 64 host mainframe sessions can occur simultaneously.

The gateway accommodates up to three types of local nets at one time and provides for local net-to-local net communications.

Compatible with the IBM Personal Computer line, the XLU costs $6,818 for eight logical units, $7,485 for 16 logical units, $8,182 for 32 logical units and $9,485 for 64 logical units, the vendor said.

Quadram, One Meca Way, Norcross, Ga. 30093.

Storage

Personal Computer Peripherals Corp. has announced the **Macbottom 20** hard disk drive for Apple Computer, Inc.'s Macintosh.

The Macbottom 20 offers a disk capacity of 21.7M bytes formatted on a 3½-in. Winchester. It can be connected to either the modem or the printer port, or one to each.

The Macbottom is priced at $1,595.

Personal Computer Peripherals, 6204 Benjamin Road, Tampa, Fla. 33614.

■

Quadram Co. is offering a line of add-on accessories for its portable computer, **Datavue 25.**

The options include a second floppy disk drive for $349 and a 300/1,200 bit/sec. Hayes Microcomputer Products, Inc.-compatible internal modem bundled with Microstuf, Inc. Crosstalk XVI software priced at $495.

In addition, a three-slot expansion chassis that accommodates three full-size IBM Personal Computer-compatible enhancement cards sells for $695 stand-alone or $1,695 with a 10M-byte hard disk drive.

Quadram, One Meca Way, Norcross, Ga. 30093.

■

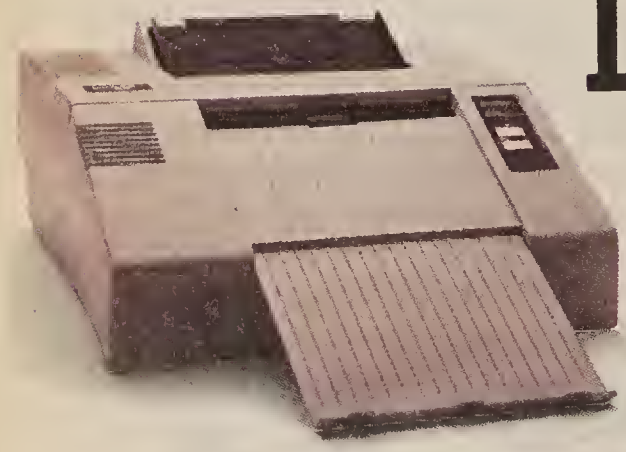
Qualogy, Inc. has added the **Twister** subsystems to its Cyclone series of mass-storage systems.

The Twister subsystems increase Digital Equipment Corp. Micro/PDP-11 and Microvax storage to 320M bytes. Twister models contain a 5¼-in. Winchester drive, diagnostic panel, mounting hardware and controller. The Winchester offers an average access time of 27 msec.

The controller/interface provides noninterleaved data transfers — the ability to transfer a complete track in one disk revolution.

Prices range from $6,195 for a 120M-byte subsystem to $11,995 for a 320M-byte system.

Qualogy, 2241 Lundy Ave., San Jose, Calif. 95131.



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That's all there is to entering an average 600 words per minute into your word processor or IBM-compatible PC. Because that's all there is to operating the new low-cost, high-speed desktop Personal Computer Scanner (PCS) from CompuScan.

PCS makes manual rekeying obsolete. Just stack up to 50 documents into its loading tray, press one button, and the autofeeder enters a page of typed copy every 30 seconds. That's 10-20 times faster than humanly possible. And 100 times more accurate.

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Yet for all its advanced features, the PCS is surprisingly affordable — about half the price of previous scanners. And its compact, desktop size makes it the hands-down choice for all your office applications.

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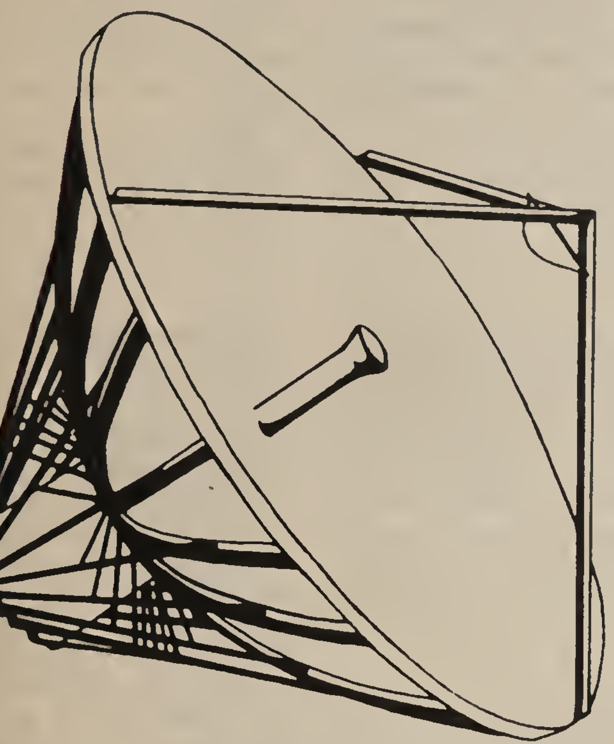

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The ARIES Group
Atlantic Research Corp.
AT&T Communications
AT&T Documentation Management Organizaton
AT&T Information Systems
AT&T
AT&T Network Systems
Avanti Communications Corp.
Avatar Technologies Inc.
Aydin Monitor Systems
Banyan Systems Inc.
BCR Enterprises Inc.
BGS Systems Inc.
Bell Atlantic Corp.
Bell Communications Research Inc.
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Printers/plotters/peripherals

Okidata Corp. has introduced the **Okimate 20 Amiga Plug 'N Print Kit**, allowing Commodore Business Machines, Inc. Amiga users to print all of the possible 4,096 screen colors.

The Okimate 20 is a ribbon transfer color printer. In the word processing mode, it prints 80 char./sec. in standard type and 40 char./sec. in letter-quality type. Okimate 20 has a 24-element print head, built-in friction and pin feed paper-handling mechanism, variable-width tractor feed and 8K-byte buffer.

The Amiga has the Okimate 20 built into its menu.

The Okimate 20 costs $169, and the Amiga Plug 'N Print Kit costs $99.

Okidata, 532 Fellowship Road, Mount Laurel, N.J. 08054.

Board-level devices

AST Research, Inc. has introduced **Fastpak**, an Intel Corp. 8086-based card, and **Rampage-Pak**, a series of piggyback cards for its Rampage and Rampage AT expanded memory specification products.

Fastpak, designed for the IBM Personal Computer or Personal Computer XT, is said to accelerate the operation of applications.

Rampage-Pak, for the IBM Personal Computer, Personal Computer XT and AT, provides I/O functions. The standard Rampage-Pak includes a serial port, parallel port and clock/calendar.

Fastpak costs approximately $500. Rampage-Pak costs $100, the vendor said.

AST Research, 2121 Alton Ave., Irvine, Calif. 92714.

Mountain Computer, Inc. has introduced the **Racecard-286**, a plug-in card for the IBM Personal Computer AT.

Racecard-286 fits in any short slot in the computer. According to a company spokesman, it runs software up to six times faster than normal without requiring any modification to the software. It emulates the IBM 8088 native processor.

Racecard costs $795.

Mountain Computer, 360 El Pueblo Road, Scotts Valley, Calif. 95066.

■

Waterloo Microsystems, Inc. has announced the **Virtual RAM card**, designed to increase the capabilities of the Waterloo Port Network operating system.

Personal computers using Virtual RAM can run 640K-byte IBM PC-DOS applications, concurrently access network services, send mail and perform terminal emulation and other multitasking applications.

The card occupies one expansion slot in an IBM Personal Computer, Personal Computer XT, AT or compatible. With 512K bytes of memory, expandable to 1M byte, it is priced at $695.

Waterloo Microsystems, 175 Columbia St. W., Waterloo, Ont., Canada N2L 5Z5.

■

Paradise Systems, Inc. has introduced the **Paradise Systems Modular Graphics Card** for the IBM Personal Computer, Personal Computer XT, AT or compatibles.

The product is an IBM Color Graphics Adapter-compatible card that supports all software written to the IBM Personal Computer color standard on any IBM monochrome, red-green-blue or composite monitor.

The card is priced at $395, including connectors for a light pen and a radio frequency modulator, random-access memory disk and print spooler software.

Paradise Systems, 217 East Grand Ave. S., San Francisco, Calif. 94080.

■

Ultragraphics Corp. has announced the **Ultragraph 800 card**, said to allow the IBM Personal Computer and Personal Computer AT to act as computer-aided design and manufacturing systems.

The Ultragraph 800 will support a resolution of 800 by 400 pixels in 16 colors. It automatically emulates an IBM Color Graphics Adapter. It is designed to operate with the Microvitec, Inc. 895 DU color monitor.

The Ultragraph 800 is priced at $995, and the Microvitec 895 DU is priced at $895.

Ultragraphics, 37 S. Franklin St., Chagrin Falls, Ohio 44022.

■

Applied Engineering and **Pinpoint Publishing** are offering a **hardware/software package** for Apple Computer, Inc.'s Appleworks.

The package combines Applied Engineering's Ramworks II board for the Apple IIe or Applied Engineering's Z-Ram board for the Apple IIc with Pinpoint's Pinpoint software package.

Ramworks II expands the available Appleworks desktop to more than 2.2M bytes and increases the maximum Appleworks data base size to more than 16,000. Z-Ram boosts the Apple IIc to 640K bytes and expands the desktop to 413K bytes.

Pricing ranges from $218 for 64K-byte Ramworks with Pinpoint to $468 for 512K-byte Z-Ram with Pinpoint.

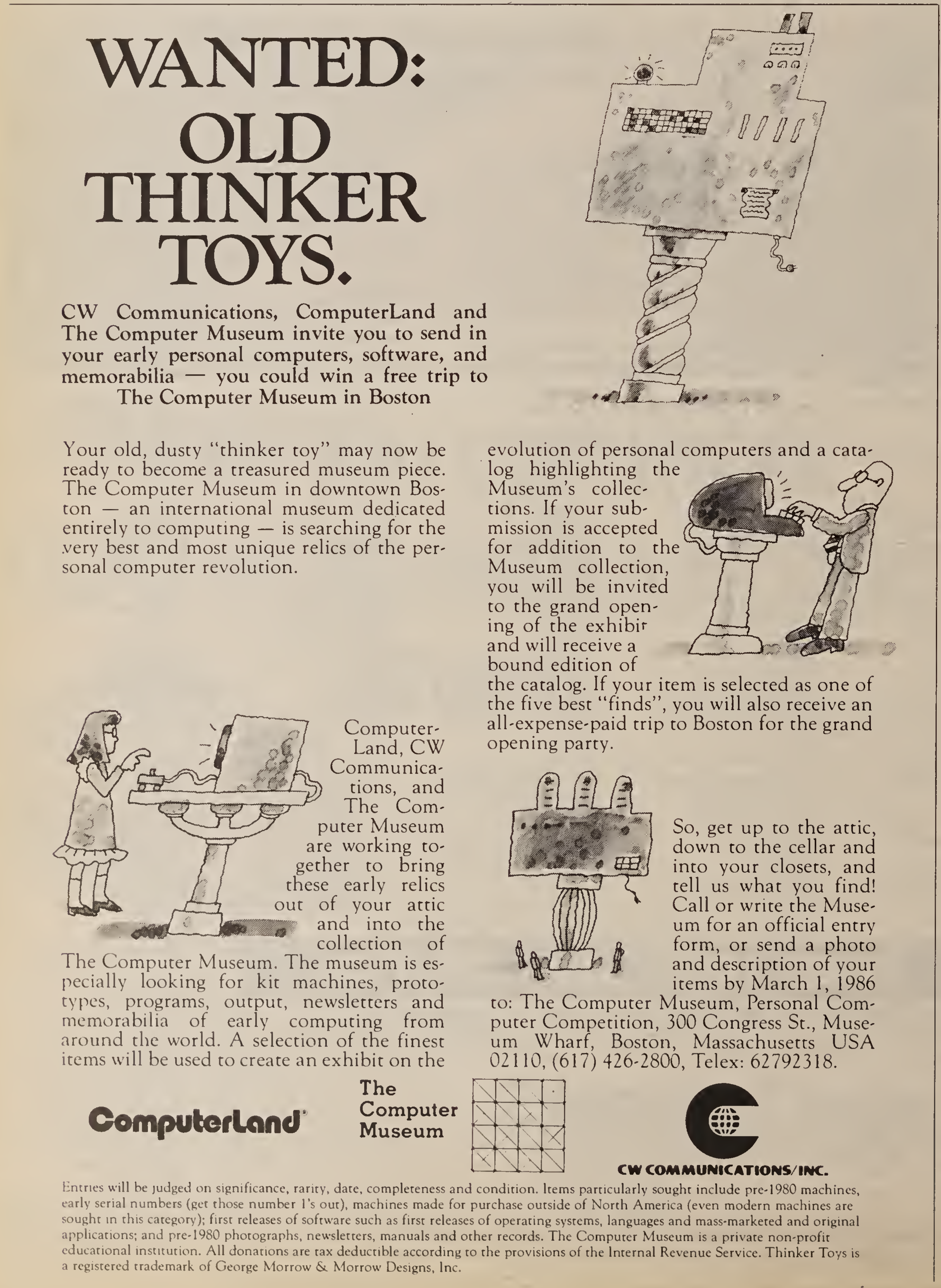
Pinpoint Publishing, Box 13323, Oakland, Calif. 94661.

■

Adex Electronics has announced the **Z286 processor board** said to add five to six times more processing power to IBM Personal Computers and compatibles.

The Z286 board incorporates the Intel Corp. 80826 microprocessor and 640K bytes of 16-bit memory. The

Continued on page 107



WANTED:
OLD THINKER TOYS.

CW Communications, ComputerLand and The Computer Museum invite you to send in your early personal computers, software, and memorabilia — you could win a free trip to The Computer Museum in Boston

Your old, dusty "thinker toy" may now be ready to become a treasured museum piece. The Computer Museum in downtown Boston — an international museum dedicated entirely to computing — is searching for the very best and most unique relics of the personal computer revolution.

ComputerLand, CW Communications, and The Computer Museum are working together to bring these early relics out of your attic and into the collection of The Computer Museum. The museum is especially looking for kit machines, prototypes, programs, output, newsletters and memorabilia of early computing from around the world. A selection of the finest items will be used to create an exhibit on the evolution of personal computers and a catalog highlighting the Museum's collections. If your submission is accepted for addition to the Museum collection, you will be invited to the grand opening of the exhibit and will receive a bound edition of the catalog. If your item is selected as one of the five best "finds", you will also receive an all-expense-paid trip to Boston for the grand opening party.

So, get up to the attic, down to the cellar and into your closets, and tell us what you find! Call or write the Museum for an official entry form, or send a photo and description of your items by March 1, 1986 to: The Computer Museum, Personal Computer Competition, 300 Congress St., Museum Wharf, Boston, Massachusetts USA 02110, (617) 426-2800, Telex: 62792318.

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Entries will be judged on significance, rarity, date, completeness and condition. Items particularly sought include pre-1980 machines, early serial numbers (get those number 1's out), machines made for purchase outside of North America (even modern machines are sought in this category); first releases of software such as first releases of operating systems, languages and mass-marketed and original applications; and pre-1980 photographs, newsletters, manuals and other records. The Computer Museum is a private non-profit educational institution. All donations are tax deductible according to the provisions of the Internal Revenue Service. Thinker Toys is a registered trademark of George Morrow & Morrow Designs, Inc.

NEW PRODUCTS/MICROCOMPUTERS

Continued from page 106

product executes instructions at 8 MHz with zero wait state. There is an optional on-board Intel 80287 math processor.

The Z286 board sells for $699.

Adex Electronics, 22994 El Toro Road, El Toro, Calif. 92630.

■

Cambridge Computer Graphics has announced a Microsoft Corp. MS-DOS-compatible **color graphics card** with windowing capabilities.

The card was designed for use in single display applications. It allows users to view graphics or computer-aided design images at the same time as other applications appear on the screen.

The card is designed for IBM Personal Computers, Personal Computer XTs, ATs and compatibles. It costs $2,200.

Cambridge Computer Graphics, 6201 Ascot Drive, Oakland, Calif. 94611.

■

Microspeed, Inc. has announced **Fast 88**, a speed enhancement board for the IBM Personal Computer, Personal Computer XT and compatibles.

Fast 88 increases performance by replacing the standard Intel Corp. 8088 CPU with a higher speed Intel 8088 Model 2 and by allowing the user to switch between the normal 4.77-MHz system clock and a selectable frequency clock generator of 6.1 MHz, 6.7 MHz or 7.4 MHz.

Fast 88 costs $149.95. Installation costs $60.

Microspeed, Suite 18, 4546 Peralta Blvd., Fremont, Calif. 94536.

Auxiliary equipment

Chorus Data Systems, Inc. has announced the **CA-1600 RGB Camera** designed for applications requiring high-quality color reproduction and resolution.

The CA-1600 includes a macrozoom lens, autoiris and selectable RS-170 black and white or National Television Standard Code (NTSC) color with simultaneous red-green-blue (RGB) output. It provides the user with both RGB and black-and-white video for computer imaging applications.

The CA-1600 RGB Camera is priced at $1,495.

Chorus Data Systems, P.O. Box 370, 6 Continental Blvd., Merrimack, N.H. 03054.

■

Micro Direct International Corp. has announced an enhanced version of its **Flipkit** software accessory.

Flipkit attaches to the keyboard of the IBM Personal Computer, Personal Computer XT, AT, Compaq Computer Corp.'s Compaq and compatibles.

Flipkit includes preprinted function key overlays for Lotus Development Corp. 1-2-3 and Symphony, IBM Writing Assistant, Microsoft Corp. Word and MS-DOS and Ashton-Tate's Dbase III.

Flipkit costs $15.95.

Micro Direct International, P.O. Box 61017, Palo Alto, Calif. 94306.

■

Chancellor Computer Corp. has introduced **Symzap**, a pan and zoom accelerator option for the company's Symgraph graphics editor and the STL family of workstations.

Symzap allows the designer to move across drawings as fast as the cursor will move.

The Symzap option sells for $2,500.

Chancellor Computer, 1101 San Antonio Road, Mountain View, Calif. 94043.

■

Eventide, Inc. has announced the **Eventide Expressway**, a buffer/spooler for the IEEE 488 bus said to allow simultaneous operation of a plotter and printer without tying up the computer.

The unit accommodates a variety of Hewlett-Packard Co. desktop computers along with printers, plotters and other peripherals. It automatically routes data intended for different peripherals even though the data comes in on a single set of lines.

The Expressway has a data transfer rate of up to 20K bit/sec. It has three ports and either 256K bytes, 1M byte or 2M bytes of memory.

Prices are $1,395 for 256K bytes, $2,195 for the 1M byte and $2,995 for the 2M-byte version.

Eventide, One Alsan Way, Little Ferry, N.J. 07643.

■

Magnetic Memory Corp. has announced a **monitor plug adaptor** designed for use with the IBM Personal Computer.

The adaptor enables users to plug non-IBM Personal Computer plug-compatible monitors into IBM Personal Computers, according to the vendor.

The adaptor is said to comprise a short cable, one end of which plugs into the Personal Computer monitor socket. The monitor plugs into the standard grounded socket at the other end.

The price of the monitor plug adaptor is $9.95

Magnetic Memory Corp., 1224 10th St., Berkeley, Calif. 94710.

COMMUNICATIONS

Voice/data communications

American Home Network has announced that its **American People/Link** telecommunciations service can now accommodate electronic spreadsheet files.

Subscribers can send the files via modems from personal computers to other People/Link subscribers.

The transmission is accomplished using the Xmodem protocol. Text files can also be transmitted.

The initial membership fee for People/Link is $14.95. Rates start at $3.95 per hour between 6 p.m. and 7 a.m. for 300 bit/sec. transmission and $4.95 per hour for 1,200 bit/sec. transmission.

Continued on page 108

A Few Words About NET/MASTER.™

For Your SNA/VTAM Network.

NET/MASTER from Cincom® is a complete set of integrated components that will maximize the capabilities of your VTAM network.

Each component satisfies the demands of a specific network situation. While all components together provide optimum VTAM effectiveness.

But whether your VTAM network needs are specific or comprehensive, it's important to remember that NET/MASTER is . . .

NEW PRODUCTS/COMMUNICATIONS

Continued from page 107

American Home Network, Suite 1505, 3215 N. Frontage Road, Arlington Heights, Ill. 60004.

■

Emulex Corp. has introduced the **Emulex SNA Cluster software/hardware package** said to provide IBM Systems Network Architecture (SNA)/Synchronous Data Link Control interactive communications and batch processing.

The package, combining IBM's PC/3270SC and PC/RJESC software with the DCP-88/VM communications coprocessor, allows a user to cluster up to four IBM Personal Computers and attached printers. Each Personal Computer can emulate either an IBM 3270 display station or a 3770 remote job entry workstation.

The SNA Cluster package ranges in price from $2,225 for a single-user system to $3,550 for a four-workstation system.

Emulex, P.O. Box 6725, 3545 Harbor Blvd., Costa Mesa, Calif. 92626.

Multiplexers/modems

Raycom Systems, Inc. has announced the **5100 Series Data PBX Fiber-Optic Multiplexer** designed to work with data private branch exchanges manufactured by companies such as AT&T, Emulex Corp. and M/A-Com, Inc.

The multiplexer has a composite link speed of 14M bit/sec. and accepts data inputs at T1 speeds of 1.544M bit/sec. and asynchronous speeds up to 19.2K bit/sec. It is modular and accepts an interchangeable mix of any two of five asynchronous and/or T1 I/O modules.

The 5100 Data PBX is priced from $2,450 for a minimum asynchronous configuration to $4,700 for a T1 maximum configuration.

Raycom Systems, 6395 Gunpark Drive, Boulder, Colo. 80301.

Local-area networks

Fast Feedback Technologies has announced the **Microlan 1553-Net** local-area network.

According to the vendor, the system is transparent to the user, who gains access by entering an identification and password. Network resources are organized by pop-up menus that allow users to explore files, programs and devices at each workstation.

Local-area network hardware is available for IBM, the Apple Computer, Inc. Apple II series and the S-100 bus. The standard Microlan card costs $350. The XL version, with on-board read-only memory costs $450.

Fast Feedback Technologies, 1505 Aviation Blvd., Redondo Beach, Calif. 90278.

Test equipment

Digilog, Inc. has announced the **Network Analysis and Management System**, powered by a Digital Equipment Corp. Microvax minicomputer, and the **Modem Diagnostic Test System**.

The Network Analysis Management System is said to provide alarm notification, local and remote diagnostic control and critical path control of elements in a data communications network. Features include automatic reconfiguration capabilities and problem reports.

The Modem Diagnostic Test System is a modem-based network management system. It is centrally controlled by an IBM Personal Computer.

Prices for the Network Analysis Management System start at $48,000. For the Modem Diagnostic Test System, prices range from $3,990 to $15,975, depending on the network configuration.

Digilog, 1370 Welsh Road, Montgomeryville, Pa. 18936.

SYSTEMS & PERIPHERALS

Processors

Preston Scientific, Inc. has announced the **GM/NMX** parallel interface designed to attach its 13-bit and 15-bit 1-MHz analog/digital conversion systems to the Numerix NMX-432 array processor.

The interface systems feature Preston's microprocessor controller providing several programmable scan modes.

The GM/NMX interface system, with differential multiplexer and a 32-channel, 13-bit 1-MHz system, costs $16,440; the 32-channel, 15-bit 1-MHz system costs $20,370.

Preston Scientific, 805 E. Creeitos Ave., Anaheim, Calif. 92805.

Terminals

Term-Tronics, Inc. has introduced the **Miracle 178/101** multihost access display terminal.

The terminal is designed to allow the user access to IBM mainframes via coaxial cable and almost any ASCII computer or network simultaneously. It offers switch-selectable keyboard flexibility with IBM 3178 C2, C3 and C4 keyboard layouts or the IBM 3101 keyboard layout.

The Miracle-178/101 with keyboard costs $1,695.

Term-Tronics, 4990 Viewridge Ave., San Diego, Calif. 92123.

■

I-O Marketing has announced the **1192 Color Terminal** for IBM System/34, 36 and 38 users.

The I-O 1192 features a 14-in. seven-color screen. It comes standard with an RS-232C screen dump printer port. An optional full-function RS-232C serial printer port, which is system addressable, is also available.

The I-O 1192 color display station costs $1,495 with screen dump printer port and $2,495 with system-addressable printer port.

I-O Marketing, 3487 W. 2100 South, Salt Lake City, Utah 84119.

■

Epic Data, Inc. has announced the **1647-520 Independent Display Terminal**.

The Independent Display Terminal collects, checks, edits and formats

Effective.

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Multiple Application Component saves time and money in your SNA/VTAM network.

This is a test. Do you know how much time and money your VTAM users waste each time they sign-on/sign-off to switch between CICS and TSO?

Figure a minimum of 3 minutes waiting time per switch. With 20 switches per day per user. Then multiply by your number of users. By your average hourly rate. By the number of work days per year.

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1-800-543-3010

data whether on-line or off-line to a controlling device. It has a six-line by 40-column display and supports bar code, magnetic stripe and keyboard data entry.

Up to 10 user-defined prompt screens and transaction definitions can be stored in the terminal. The keyboard features 60 alphanumeric membrane keys in three configurations.

The price is $3,495.

Epic Data, 7280 River Road, Richmond, B.C., Canada V6X 1X5.

■

IBM has announced the **4680 Store System**, a retail point-of-sale system designed for department stores and mass merchandisers.

The system consists of modular IBM 4683 point-of-sale terminals and two models of the IBM 5170 PC AT.

The 4680 Store System allows users to enter transactions, check items and authorize customer credit as well as provide sales and inventory reports and perform a cash count at the end of the day.

Prices for the 5170 PC AT start at $9,120; the 4683 terminals start at $2,928; the Multiprotocol Communications Adapter feature costs $475.

IBM, Old Orchard Road, Armonk, N.Y. 10504.

Printers/plotters

CNW Technology, Inc. has announced **Lasermax 3278**, .a device that allows a Hewlett-Packard Co. Laserjet printer or other ASCII printers to interface with an IBM 3274/3276/4701 controller or 4321/4331 CPU using the IBM Type A coaxial port.

Lasermax 3278 provides the IBM 3270 protocol conversions and 3278 printer emulation by manipulating the data stream. The user can use a text editor to reconfigure the Lasermax 3278 for custom operations. Both systems network architecture, and LU3 capabilities are built in.

Lasermax 3278 costs $3,495.

CNW Technology, 405 W. Chestnut, Yakima, Wash. 98902.

■

Versatec, Inc. has announced **Spectrum**, a hard-copy device that produces color or monochrome output of text or graphics standard A-size pages or B-size drawings.

Spectrum prints or plots on 11-in. wide paper or polyester film media at 2 in./sec. with a resolution of 200 point/in. It operates as a a full color plotter or line printer and can also serve as a color or monochrome CRT hard-copy device with an optional video interface that includes a frame buffer.

Spectrum costs $11,950.

Versatec, 2710 Walsh Ave., Santa Clara, Calif. 95051.

Graphics systems

Sun Microsystems, Inc. has announced the **Sun-2/160T workstation**, the first member of its Tempest-qualified family of workstations.

The Sun-2/160T meets Nacsim 5100A test limits.

The product includes a Motorola, Inc. 68010 microprocessor, 4M bytes of main memory and two 71M-byte, 5¼-in. disk drives with a 45M-byte, 1¼-in. streaming cartridge tape drive, according to Sun Microsystems.

The workstation is priced at $60,800.

Sun Microsystems, 2550 Garcia Ave., Mountain View, Calif. 94043.

Auxiliary equipment

Wespercorp has introduced the **Digivoice DV-1000**, an audio digitizer and playback unit that is said to convert either audio responses to digital sequences or digital sequences to audio.

In addition to storing and recalling up to 10,000 messages, the DV-1000 translates signals from switches or computer equipment and responds with previously entered spoken announcements or warnings, according to the vendor.

The basic system includes a processor board, RS-232C serial port, random-access memory, power supply, microphone and a case with monitor speaker. It is priced at $2,600.

Wespercorp, 14511 New Myford Road, Tustin, Calif. 92680.

PRICE REDUCTIONS

Wyse Technology, Inc. has reduced the price of its **WY-85** display terminal.

The WY-85 is functionally compatible with the Digital Equipment Corp. VT220, VT100 and VT52. It includes a 14-in. screen, 30 programmable function keys and a low profile, height-adjustable keyboard.

The new price is $599. With an optional amber screen, the price is $629.

Wyse Technology, 3571 N. First St., San Jose, Calif. 95134.

■

American Channels, Inc. has announced a user's evaluation kit for its **AC/DIAD** computer-aided drafting and design system.

The kit, which contains software, a demonstration of the system's capabilities, a full set of documentation and guidelines for conducting an evaluation, is available to all qualified inquirers and is free for 90 days. The kit requires a Digital Equipment Corp. VAX or Apollo Computer, Inc. Domain computer system.

American Channels, 1050 Waltham St., Lexington, Mass. 02173.

■

Artronics Corp. has reduced the price of two of its **Studio Computer Systems.**

The Artronics 24-color plane true color and the 1,000-line Studio Computer Systems with the Image Grabber package now cost $46,000. Without Image-Grabber,. the price is $39,000.

Artronics, P.O. Box 408, 300 Corporate Court, South Plainfield, N.J. 07080.

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CALENDAR

WEEK OF JANUARY 26

JANUARY 27-31, ORLANDO, FLA. — **Writing Procedures, Policies and Documentation.** Contact: Mary Ann Cluggish, Information Mapping, Inc., 275 Wyman St., Waltham, Mass. 02154. Also being held Feb. 3-7 in Dallas and Feb. 10-14 in Washington, D.C.

JANUARY 28, AUSTIN, TEXAS — **U.S. Invitational Computer Conference.** Contact: Suzanne Hubner, U.S. Conference Director, Invitational Computer Conference, No. C-2, 3151 Airway Ave., Costa Mesa, Calif. 92626. Also being held Jan. 30 in Dallas; Feb. 27 in Fort Lauderdale, Fla.; March 18 in San Jose, Calif.; and April 2 in Nashua, N.H.

JANUARY 29, DEDHAM, MASS. — **Newsletter Preparation: Design and Layout.** Contact: Frank R. Trocki, Graphic Arts Program, Northeastern University Center for Continuing Education, 370 Common St., Dedham, Mass. 02026.

JANUARY 29-31, BOSTON — **How to Select and Implement a Telephone System.** Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521.

JANUARY 29-31, DALLAS — **Data Communications I — Basic Concepts.** Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521.

JANUARY 29-31, SCOTTSDALE, ARIZ. — **1986 Robotic Industries Association Annual Meeting.** Contact: Robotic Industries Association Headquarters, P.O. Box 1366, Dearborn, Mich. 48121.

JANUARY 30, DEDHAM, MASS. — **Elements and Applications of Microcomputers in the Graphic Arts Industry.** Contact: Frank R. Trocki, Graphic Arts Program, Northeastern University Center for Continuing Education, 370 Common St., Dedham, Mass. 02026.

JANUARY 30, NASHUA, N.H. — **Assertive Management.** Contact: Seminar Administrator, New Hampshire College, Resource Center, 2500 N. River Road, Manchester, N.H. 03104.

JANUARY 30-FEBRUARY 1, ORLANDO, FLA. — **SEROMDA '86 Convention and Exposition.** Contact: Southeastern Regional Office Machine Dealers Association, Inc., Suite 111, 224 Peters Road, Knoxville, Tenn. 37923.

JANUARY 30-FEBRUARY 2, LAS VEGAS — **Healthcom '86 — Computers, Telecommunications and Information Systems for the Health Care Industry.** Contact: Lin Fish, Fleishman & Linden Expositions Group, Inc., 2401 Plum Grove Road, Palatine, Ill. 60067.

WEEK OF FEBRUARY 2

FEBRUARY 2-5, SCOTTSDALE, ARIZONA — **Sixth Management Conference of the Value Group.** Contact: Value Group, Inc., Suite 1717, 435 N. Michigan Ave., Chicago, Ill. 60611.

FEBRUARY 3-6, CINCINNATI — **Fourteenth Annual ACM Computer Science Conference and Employment Register.** Contact: Orrin E. Taulbee, Association for Computing Machinery, Department of Computer Science, University of Pittsburgh, P.O. Box 13526, Pittsburgh, Pa. 15243.

FEBRUARY 3-6, LAS VEGAS — **AFCOM's 6th Annual Conference and Trade Show.** Contact: Association for Computer Operations Managers, Suite 201, 11501 Brookhurst, Garden Grove, Calif. 92640.

FEBRUARY 3-7, MONTEREY, CALIF. — **ATI '86 — Seventh Annual Symposium on Automation Technology, CAD/CAM and Engineering Data Handling.** Contact: Jeff Smith, American Technology Institute, Inc., P.O. Box 242, Pebble Beach, Calif. 93953.

FEBRUARY 4-6, NEWPORT BEACH, CALIF. — **1986 Patran Users Conference.** Contact: Software Products Division, PDA Engineering, 1833 E. Alton Ave., Irvine, Calif. 92714.

FEBRUARY 4-7, ANAHEIM, CALIF. — **Third Annual Uniforum.** Contact: /Usr/group International Network of Unix Users, Suite 200, 4655 Old Ironsides Drive, Santa Clara, Calif. 95054.

FEBRUARY 5-7, HOUSTON — **Strategic Data Planning and Modeling.** Contact: Barnett Data Systems, 19 Orchard Way N., Rockville, Md. 20854.

WEEK OF FEBRUARY 9

FEBRUARY 9-12, ATLANTA — **SAS Users Group International's Eleventh Annual Conference — SUGI 11.** Contact: SUGI Coordinator, SAS Institute, Inc., Box 8000, SAS Circle, Cary, N.C. 27511.

FEBRUARY 9-12, ORLANDO, FLA. — **American Bankers Association's 1986 Telecommunications and Financial Networks and Video Banking III Conferences.** Contact: Linda Gustavson, ABA Operations Group, 1120 Connecticut Ave. N.W., Washington, D.C. 20036.

FEBRUARY 9-13, PALM SPRINGS, CALIF. — **Third Annual Electronic Printing Sytems Conference.** Contact: Dunn Technology, Inc., Suite 1, 1855 E. Vista Way, Vista, Calif. 92084.

FEBRUARY 10-11, NEW YORK — **Intro to Lotus — Advanced Lotus.** Contact: Center for Advanced Data Processing, Suite 402, 450 7th Ave., New York, N.Y. 10123.

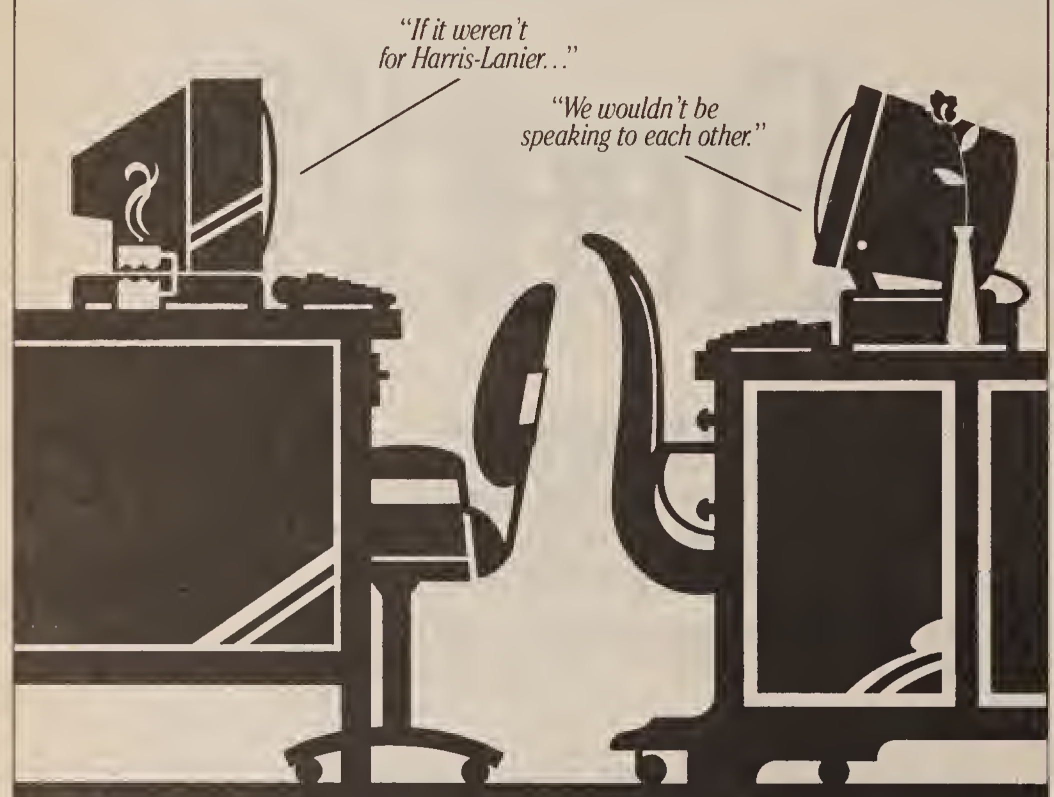
FEBRUARY 10-11, WASHINGTON, D.C. — **Writing Management Reports.** Contact: Mary Ann Cluggish, Information Mapping, Inc., 275 Wyman St., Waltham, Mass. 02154.

FEBRUARY 10-12, ALBUQUERQUE, N.M. — **Fiber-Optic Technology Training.** Contact: Linda Castle, Optoelectronic System Consultants, P.O. Box 35525, Albuquerque, N.M. 87176.

FEBRUARY 11-12, NEW YORK — **IBM's Master Plan, 1986-1990.** Contact: Yankee Group, 14th Floor, 89 Broad St., Boston, Mass. 02110. Also being held Feb. 18-19 in San Francisco.

FEBRUARY 13-14, WASHINGTON, D.C. — **Bypassing the Local Telephone Exchange: Third Annual Conference.** Contact: Conference

See **CALENDAR** page 112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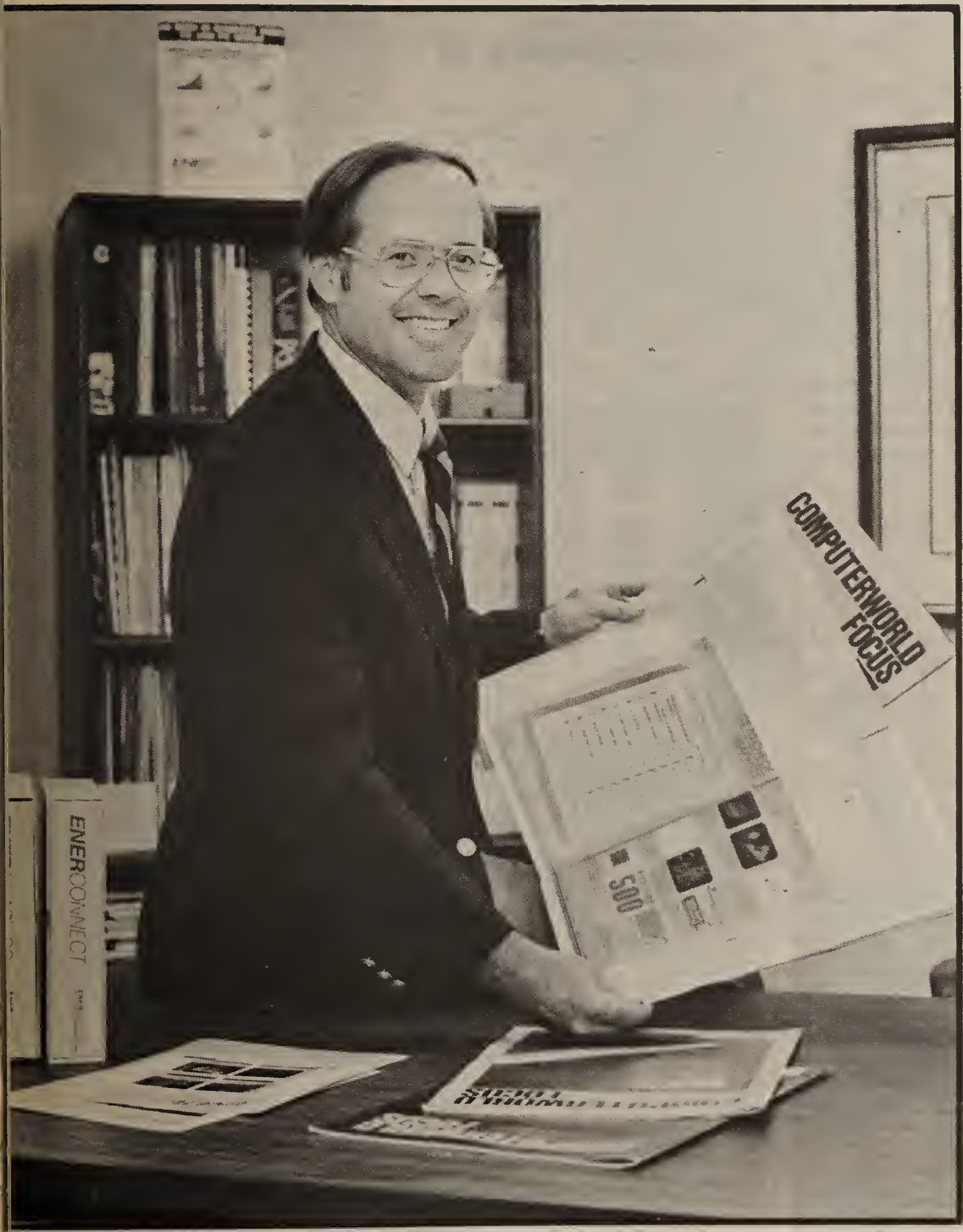

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Randy T. Andes, Director of Marketing,
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Registrar, Phillips Publishing, Inc., 7811 Montrose Road, Potomac, Md. 20854.

WEEK OF FEBRUARY 16

FEBRUARY 16-19, AUSTIN, TEXAS — **The DCEA Conference: Desktop Computers in Engineering and Architecture.** Contact: Donna Passons, University of Texas CLE Program, 727 E. 26th St., Austin, Texas 78705.

FEBRUARY 18-19, NEW YORK — **Intro to Dbase.** Contact: Center for Advanced Data Processing, Suite 402, 450 7th Ave., New York, N.Y. 10123.

FEBRUARY 18-19, SAN JOSE, CALIF. — **Institute of Electrical and Electronics Engineers, Inc. 1986 Annual Meeting.** Contact: IEEE, Annual Meeting Department, 10th Floor, 345 E. 47th St., New York, N.Y. 10017.

FEBRUARY 20, LONDON — **Europe Invitational Computer Conference Series.** Contact: Beatrice Labbe-Anderson, International Conference Director, Invitational Computer Conference, No. C-2, 3151 Airway Ave., Costa Mesa, Calif. 92626. Also being held Feb. 25 in Frankfurt, Feb. 27 in Zurich, March 4 in Paris and March 10 in Tel Aviv.

WEEK OF FEBRUARY 23

FEBRUARY 23-26, SAN FRANCISCO — **Seventh Structured Development Forum.** Contact: Garant and Associates, Seventh Structured Development Forum, 45 Via Navarro, Greenbrae, Calif. 94904.

FEBRUARY 24-26, MARINA DEL REY, CALIF. — **Trax User Conference.** Contact: Trax Softworks, Inc., 10801 National Blvd., Los Angeles, Calif. 90064.

FEBRUARY 24-28, LOS ANGELES — **Adajug/Sigada Conference.** Contact: Benjamin Brosgol, Vice-Chairman of Sigada, Alsys, Inc., 1432 Main St., Waltham, Mass. 02154.

FEBRUARY 24-29, PARIS — **MICAD '86.** Contact: Caby C. Smith, World Computer Graphics Association, Suite 399, 2033 M St. N.W., Washington, D.C. 20036.

FEBRUARY 26, DEDHAM, MASS. — **Marketing Strategies/ Marketing Communications.** Contact: Frank R. Trocki, Graphic Arts Program, Northeastern University, Center for Continuing Education, 370 Common St., Dedham, Mass. 02026.

FEBRUARY 26-27, NEW YORK — **Intro to Symphony: The Spreadsheet — Symphony for Spreadsheet Users.** Contact: Center for Advanced Data Processing, Suite 402, 450 7th Ave., New York, N.Y. 10123.

FEBRUARY 26-28, NEW ORLEANS — **Innovative Systems, Inc. Annual Users Group Conference.** Contact: Innovative Systems, Inc., 341 Fourth Ave., Pittsburgh, Pa. 15222.

WEEK OF MARCH 2

MARCH 3-7, DENVER — **Sixth Annual Alpha Micro Users Society Convention.** Contact: Sharon Greene, Alpha Micro Users Society, 735 Walnut St., Boulder, Colo. 80302.

MARCH 4-6, PARIS — **Securicom '86 — Fourth Worldwide Congress on Communications Security and Protection.** Contact: Securicom-SEDEP, 8 Rue de la Michodiere, 75002 Paris, France.

MARCH 4-7, ORLANDO, FLA. — **Personal Financial Services.** Contact: Peggy Meyer, Bank Administration Institute, 60 Gould Center, Rolling Meadows, Ill. 60008.

WEEK OF MARCH 9

MARCH 10-14, DALLAS — **Second International Integrated Services Digital Networks Exposition.** Contact: Danae Fasano, Conference Coordinator, Information Gatekeepers, Inc., 214 Harvard Ave., Boston, Mass. 02134.

MARCH 12-14, DETROIT — **Artificial Intelligence for the Automotive Industry — The Demystification.** Contact: Dale Mason, Technical Activities Department, Society of Manufacturing Engineers, Computer and Automated Systems Association of SME, P.O. Box 930, One SME Drive, Dearborn, Mich. 48121.

WEEK OF MARCH 16

MARCH 17-21, MILWAUKEE — **Test Data Acquisition and Processing for Instrumentation Applications.** Contact: John T. Snedeker, Program Director, Center for Continuing Engineering Education, University of Wisconsin at Milwaukee, 929 N. Sixth St., Milwaukee, Wis. 53203.

MARCH 18-21, LAS VEGAS — **Check Processing.** Contact: Peggy Meyer, Bank Administration Institute, 60 Gould Center, Rolling Meadows, Ill. 60008.

MARCH 19-21, LAS VEGAS — **CDLA Spring Meeting.** Contact: Dianne L. Sims, Manager of Convention Planning, Computer Dealers and Lessors Association, Inc., 1212 Potomac St. N.W., Washington, D.C. 20007.

MARCH 19-21, BLACKSBURG, VA. — **Personal Computer Interfacing for Scientific Instrument Automation.** Contact: Linda Leffel, C.E.C., Virginia Polytechnic Institute and State University, Blacksburg, Va. 24061.

WEEK OF MARCH 23

MARCH 24-26, CHICAGO — **Systems One Conference and Exposition.** Contact: Michael A. Tew, Technical Activities Department, Society of Manufacturing Engineers, P.O. Box 930, One SME Drive, Dearborn, Mich. 48121.

MARCH 24-27, SINGAPORE — **Artificial Intelligence '86 Conference: AI and its Applications — A State of the Arts Review.** Contact: John Tagler, Elsevier Science Publishers, 52 Vanderbilt Ave., New York, N.Y. 10017.

WEEK OF MARCH 30

MARCH 31-APRIL 2, RICHMOND, VA. — **The Annual Parnassus Management Conference.** Contact: Parnassus, Inc., 100 Boylston St., Boston, Mass. 02116.

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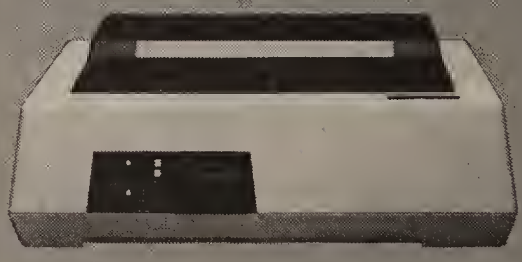

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IBM Europe exec sizes up Big Blue's overseas strategy

Government restriction, procurement top issues

PARIS — In its efforts to dominate the information technology markets of Europe the way it does in the U.S., IBM faces the same hurdles as other vendors: the strict regulations of government-owned Postal Telephone and Telegraph (PTT) authorities, traditionally conservative procurement policies and a yet-to-mature personal computer market.

In a recent interview with Computerworld News Service International Editor/Europe Amiel Kornel, IBM Europe Chairman Kaspar V. Cassani said he believes in lively competition, matching technology to user requirements and what he calls "the effective use of information technology."

Will IBM's effort to expand in Europe's telecommunications market put it into conflict with the tough regulations of the PTTs, which favor domestic vendors? If so, how will IBM cope?

In the data processing industry, we have seen how progress has benefited from lively competition, lack of undue regulatory constraints and a sensible approach to standards. Exactly the same situation should prevail in telecommunications, especially since data processing and telecommunications are becoming one industry:. information technology.

Major segments of telecommunications in most European countries are still characterized by market regulation and the national supplier concept. IBM supports the European Economic Community and other international organizations in their efforts toward greater liberalization of regulations and the creation of a homogeneous European telecommunications market.

Have Europe's domestic telecommunications vendors, which have long relied on their contacts with PTTs, become easy targets for competition from IBM?

Europe has some of the largest, most capable telecommunications companies in the world, and there is no question that they have what it takes to compete with anybody. However, the environment in which Europe's domestic telecommunications vendors operate is changing, and I believe it is in the best interest of the vendors to change with it.

IBM Europe's Kaspar Cassani

We estimate that the European revenue of the information technology industry will be almost $150 billion in 1985 and that 55% of that will come from telecommunications services and equipment. If Europe wants to maintain its share of this business and have prompt access to the improvements in industrial competitiveness afforded by new services, Europe must move toward a competitive market, such as the market that exists in the U.S. and Japan.

Procurement policies that favor national suppliers might have been justified when the cost of research and development was proportionally less and duplicate product development was still affordable. But in today's rapidly evolving telecommunications market, closed procurement holds back innovation and is actually a disservice to the favored supplier, who becomes uncompetitive in international markets.

You have called for clear definitions of the boundary between basic transmission services and enhanced services. What definition do you propose for en-

See **IBM** page 114

SIA predictions lack credibility

From page 146

dent" of the SIA — although it will be headed by former SIA President Hinkelman. The WSTS data collection methods are not likely to change under Hinkelman, who worked to create the group; hence, the optimistic predictions are likely to continue. Only this time, they will not be labeled as SIA forecasts.

"We are more likely to let the WSTS make its predicitions and then act as a commentator on those numbers," Procassini said.

Making the WSTS an independent organization is about the only major change the SIA expects this year. Procassini said the group will continue to focus on trade issues with Japan, carefully monitoring its own petition to the U.S. Department of Commerce seeking greater access to Japanese semiconductor markets. "I know what the SIA has been doing over the years, and my first responsibility is to carry that on," he said.

However, while most of its members have just barely survived the worst year in the industry's history, Procassini's more-of-the-same theory may not be enough.

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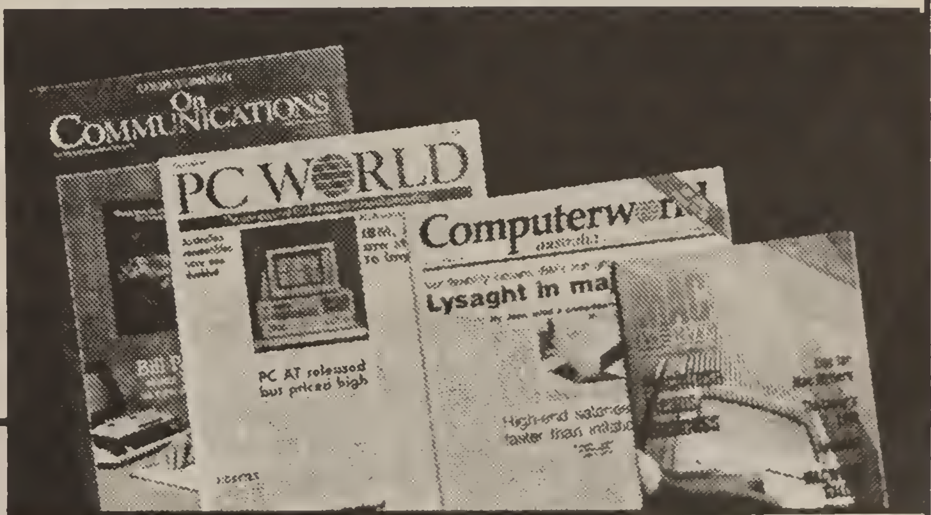

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Uccel sells cross-industry application segment to Global

To focus on banking, systems software

By Rosemary Hamilton

DALLAS — Sticking to its plans to concentrate on the mainframe systems and banking applications software market, Uccel Corp. recently sold a segment of its cross-industry applications software division to Global Software, Inc., a small subsidiary of Hathaway Corp., for $3 million in cash and notes.

The sale included five applications packages — accounts receivable, fixed assets, general ledger, accounts payable and a tax program — that Global plans to integrate into its existing product line.

Also included in the sale were customer support facilities in Dallas and Chicago, approximately 80 Uccel employees and about 1,000 Uccel customers currently under maintenance contracts.

Streamlining business

Since last year, Uccel has been streamlining its business by acquiring a number of companies and by selling off segments of its operations that did not fit into the new corporate strategy.

The recently sold Uccel segment was part of the company's applications software division that has since been renamed as the financial systems division.

It accounted for approximately 5% of Uccel's 1985 revenues, according to Donald Steele, vice-president and general manager of the renamed division.

Although last year's results have not been released, a company spokesman said total revenues will exceed $200 million.

May boost ranking

Ronald Kupferman, president of Global, said the purchase will increase the company's share of the general ledger software market to 20% and boost its ranking in the accounts receivable software market to the No. 2 slot behind Management Science America, Inc., a software vendor based in Atlanta.

"We have aggressive plans to be a major player in these markets. This is just the first step," Kupferman said.

Raleigh, N.C.-based Global, which had been a division of Storage Technology Corp., was acquired by Hathaway last year. Prior to the acquisition, the company had revenues of $8.4 million, and it expects revenues of $18 million this year.

In another Uccel corporate transaction, Software Corporation of America, which was acquired by Uccel last fall, has changed its name to Uccel Express Software. The Herndon, Va.-based developer of utility programs for the IBM MVS environment will operate as a division of Uccel.

IBM exec on Big Blue overseas

From page 113

hanced services?

A basic transmission service is one that only moves information from place to place, without changing its form or content, through public switched networks, leased circuits and public data networks. If the form or content of the information is changed, we speak of enhanced services, which includes message storage, code and protocol conversion, information retrieval and information processing.

Our opinion is that the PTTs should continue to offer basic services on a monopoly basis but that all enhanced services should be open to competition, with the PTT as one of the competitors, if it so chooses.

Is it possible that IBM will bring to Europe the value-added network products that come out of its joint development venture with Nippon Telegraph and Telephone Corp.?

I don't think I can speculate on that possibility.

Where is IBM headed with regard to Open Systems Interconnect (OSI)? Does the company plan to make OSI and IBM's Systems Network Architecture (SNA) compatible?

With regard to OSI, IBM is headed in the same direction as it has always headed since the OSI effort began in 1977 — supporting the development of OSI as an international standard for connecting networks. We have had OSI products for several years, and as more of the seven layers of the OSI reference model become defined and standardized, we are bringing more products to the market.

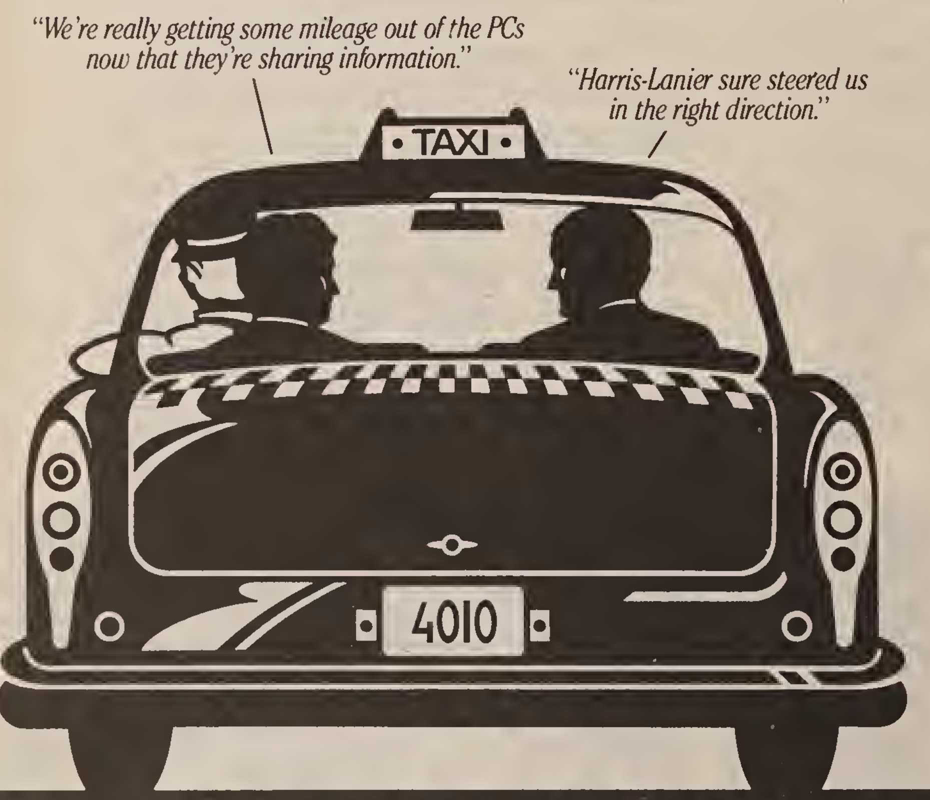
SNA and OSI are complementary. OSI is in the process of being defined as a set of international standards for connecting heterogneous networks, that is, systems with different proprietary architectures. We support that effort completely in our product developments in general and have special centers in West Germany and France to promote development of OSI standards.

What does an OSI-based product need to succeed in the European market?

Most importantly, it needs to serve user requirements. It will take many more years of hardware and software development before we have a full implementation of OSI on all levels and across the entire product spectrum.

Why is IBM's Personal Computer market share lower in Europe than in the U.S.?

Given the extremely broad range of products that fall under the term "personal computer," I don't think we can really discuss market share. There is, in general, a one- to two-year time lag in the market penetration of personal computers in Europe, compared with the U.S. But the growth rate in Europe is currently higher than in the U.S.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> The collective brainpower of the computers sold in the next two years will equal that of all the computers sold from the beginning to now. Four years from now it will have doubled again.

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We also offer seven personal computer publications. *InfoWorld*, the personal computer weekly, is a general interest magazine for all personal computer users.

The other six are monthly magazines that concentrate on specific microcomputer systems. *PC World*, the comprehensive guide to IBM personal computers and compatibles. *inCider*, the Apple II journal. *Macworld*, the Macintosh magazine. *80 Micro*, the magazine for TRS-80 users. *HOT CoCo*, the magazine for TRS-80 Color Computer and MC-10 users. And *RUN*, the Commodore 64 & VIC-20 magazine.

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Fibronics gets software in Spartacus aquisition

HYANNIS, Mass. — Fibronics International, Inc., a maker of fiber-optic and coaxial communications systems, recently announced plans to acquire Spartacus, Inc. of Bedford, Mass., a maker of network software, for approximately 380,000 shares of Fibronics stock, which is worth about $6 million.

The previously reported acquisition [CW, Jan. 13] must be approved by the boards of both companies. It is expected to be completed by February, at which point Spartacus will become a wholly owned subsidiary of Fibronics.

Fibronics' high-speed fiber-optic systems are used primarily to link mainframes to other mainframes or peripheral devices. "We see ourselves as having superior hardware, and this acquisition is an insertion of strong software talent into Fibronics," Chairman Morris Weinberg said.

Spartacus had made an unsuccessful bid for the IBM 4300-compatible market. In 1984, it dropped the word "Computer" from its name and became a networking software company.

Its best known product is Knet, which allows IBM mainframes to communicate with each other using Ethernet, a channel-to-channel adapter link or a Binary Synchronous Communications link.

The company also markets the K200 Ethernet Control Unit, a device that allows direct channel attachment of an IBM system to an Ethernet network to communicate with other mainframes or devices attached to the network.

Spartacus President James Atkins, who considers his company still to be in "the product development mode," said the acquisition will provide the "marketing leverage we need by teaming up with a name in the industry."

Weinberg said Spartacus is his company's first acquisition and will probably be the last for the near future.

— **Rosemary Hamilton**

High-tech task force sets agenda

Seeks incentives, R&D tax credit

By Mitch Betts

WASHINGTON, D.C. — Outlining their legislative agenda on high-technology issues, Republicans in the U.S. House of Representatives said the government should provide incentives for risk taking and capital formation, ensure an adequate supply of skilled workers and expand market opportunities in international trade.

The House Republican Task Force on High Technology Initiatives recently released a 1986 agenda that recommended the following policy changes:

■ Reform the U.S. tax code to reduce the cost of capital and make the 25% research and development tax credit permanent and applicable to computer software and start-ups. The credit expired Dec. 31, 1985, but could be revived this year.

■ Encourage the retraining of workers from declining industries so that they can be productive members of high-technology industries. This could be accomplished by creating special accounts, like Individual Retirement Accounts, so people can set aside funds tax free and later withdraw the money to pay for retraining.

■ Modify U.S. trade laws to make the government more responsive to unfair trade practices by other nations. The U.S. Trade Representative should be permitted to provide interim relief to affected industries while formal rulings are pending, and rulings should be based on consideration of the full range of the competing nation's trade practices.

The group's report said these legislative initiatives "can and should be implemented in 1986."

The agenda is supported by the American Electronics Association, the Association of Data Processing Service Organizations, Inc., the Computer and Communications Industry Association, the Electronic Industries Association, the National Society of Professional Engineers and the Semiconductor Industry Association.

Controlling the regionals

From page 146

tion of shared tenant services and opened a formal inquiry into the long-term impact of shared tenant services on local-exchange telephone service. The FCC said shared tenant services cannot offer resale of long-distance service.

Greene's order denied a request by Ameritech to offer shared tenant services that encompassed the automatic selection of a long-distance carrier for a shared tenant services customer as well as traffic analysis. Greene said automatic selection of a long-distance carrier amounted to interexchange business by the local telephone company and that traffic analysis constituted an information service, both prohibited by the divestiture decree.

Greene decried Ameritech's apparent lack of a service mentality, a lack of which had also "imbued AT&T" in its former undivested state.

"By contrast, the regional holding companies . . . indicate by their public statements, advertisements and their rush to diversification, combined with their relative lack of interest in basic telephone service itself, that an ascent into the ranks of conglomerate America rates far higher on their list of priorities than their provision of the best and least costly local telephone service," Greene added.

Greene said there was no reason that the seven regional holding companies cannot prosper in the delivery of local exchange services, customer premises equipment and directory advertising.

His views sharply contrast those of the Reagan administration, which supported Ameritech's petition for clarification of the divestiture decree, and also contrast the views of the FCC, which supports the ability of the telephone companies to offer enhanced information services over the local exchange.

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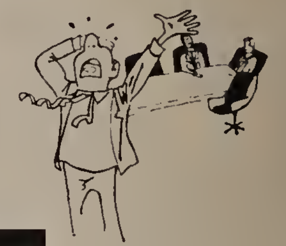

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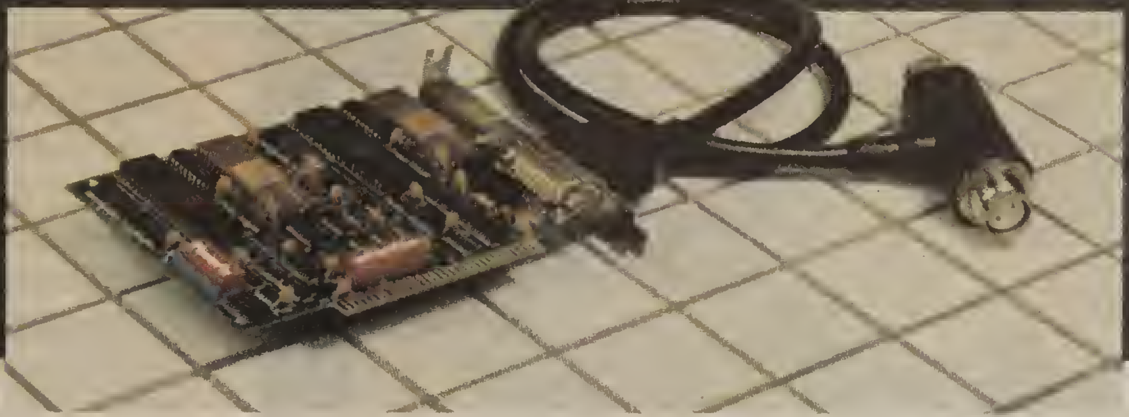

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Customs Service creating network to handle import stats

Automated operation designed to replace paper-intensive system

By Mitch Betts

WASHINGTON, D.C. — The U.S. Customs Service is developing a computer network that it hopes will fix the government's serious and embarrassing problem with outdated statistics on imports.

The Automated Commercial System (ACS) will replace a paper-intensive reporting operation with a toll-free communications link that allows custom house brokers to transmit information about imported merchandise directly to the agency's IBM 3084 mainframe computer. The system will be fully developed by the end of 1987, John Durant, acting director of the ACS division, told *Computerworld* in a recent interview.

Last August, the U.S. Bureau of the Census notified customs that a serious carryover problem with import statistics had been discovered. The carryover rate, which is the percentage of data reported in the current month's statistics that is actually data from previous months, was as high as 50% in some cases.

The import figures — compiled by the Census Bureau from raw data provided by customs officials — are important to U.S. policymakers, particularly at a time of international trade tensions. Moreover, the aggregate import figure affects the measure of the nation's total economic output, the gross national product (GNP), because imports are subtracted from the GNP.

After discovering the problem with delayed import data, the Census Bureau had to make major revisions in its widely followed reports on the U.S. economy, including the GNP and the U.S. trade deficit.

For example, a surge of imports that actually occurred in the fourth quarter of 1984 was reported in the first quarter of 1985, making the economy look artificially strong in late 1984 and weak in early 1985. Adjusting for the reporting delays, the Census Bureau found that first-quarter 1985 GNP growth was a solid 3.7% rather than 0.3%, while the previous quarter's GNP growth was a meager 0.6% rather than 4.3%.

Customs officials say the existing paper-intensive system must be revamped and automated. "I believe that the way to collect timely, accurate statistics is to collect them electronically, directly from the international trade community," William von Raab, commissioner of the Customs Service, said last month. "ACS will help to make 'carryover' a word for the history books," he added.

The objective of the ACS is to reduce drastically the paper exchanges between brokers and the Customs Service, using a variety of on-line and batch processing modules in the ACS. The Automated Broker Interface, a key module that has been operating on an experimental basis since 1984, allows brokers to transmit import data over dial-up lines to the agency's IBM 3084 for batch processing.

The brokers transmit over six 4.8K bit/sec. and six 2,400 bit/sec. voice-grade lines furnished by AT&T.

The broker network reduces the amount of data that must be keyed by customs personnel into the computer, provides more accurate and timely information and helps the agency deal with a major cutback in personnel, officials said. Eventually, the Customs Service will have a direct communications link to the Census Bureau's computers, they added.

At last report, about 12% of customs entries were being processed through the Automated Broker Interface, and the agency is pushing to increase that volume to 75%. Durant warned trade brokers in a speech last year that those who do not automate will not get as speedy service as those who do.

Tax battle may be trouble for lessors

From page 146

values of equipment as earnings [CW, Oct. 17, 1983].

"It is ironic that in the past they were in trouble for reporting too much income, and now the IRS is saying they should have reported more," said analyst John Keefe of Drexel Burnham Lambert, Inc.

Comdisco has filed a petition in U.S. Tax Court in Washington, D.C., challenging the proposed assessment. The court battle is expected to last at least six months.

"This has never been an issue with the IRS before," said Comdisco spokeswoman Lisa Antonelli. "Now they have suddenly decided it is income when we received it, as opposed to borrowing. It is very unwarranted, and considering that we earned approximately $84 million before taxes in that period, we feel the amount is a little out of line."

Comdisco mailed a letter to its shareholders last week outlining its position and expressing confidence in the outcome of the case.

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Smithsonian receives IBM grant for computer exhibit hall

WASHINGTON, D.C. — The Smithsonian Institution announced that it has received a grant of $1 million from IBM for a new exhibition hall on information technology at the National Museum of American History.

The Smithsonian has undertaken a fund-raising campaign to raise $4.3 million from the computer and communications industries to establish the "Information Revolution" exhibition. The high-technology exhibition is expected to open in 1989 [CW, Nov. 18].

The IBM gift will be made during a four-year period, representatives said. IBM contributed $250,000 this month, and the next payment will be contingent on the Smithsonian getting commitments for the remaining $3.3 million needed to create the exhibition, according to the representatives.

Canadian start-up owes $5.6 million

From page 146

more than $3.5 million raised through the scientific research tax credit, a provision of the Canadian income tax code that has since been repealed.

Xanaro spent $3 million on product development and more than $1 million for packaging, according to Hryniak. Last November, 600,000 demonstration disks were included free in a $2 million *PC World* promotion that received industrywide attention. Hryniak placed advertisements on television and in major magazines — ads that featured users getting squirted with water by rambunctious personal computers — always confident that sales would cover debts incurred.

But the firm never achieved broad distribution for Ability. Although it was hailed by reviewers as powerful and easy to use, the product was hurt by upgrades from its competitors while the integrated software market was slow to take hold. "Heavy competition from Lotus' 1-2-3 and Symphony ganged up to keep Ability off the shelf," said a source who asked not to be identified. Hryniak was unavailable for comment at press time.

For a while Xanaro rode high on its own hopes. Around the time of the *PC World* giveaway, Hryniak hired Carl Gritzmaker as vice-president of sales. A veteran Lotus and Ashton-Tate executive with a knack for boosting distribution to the corporate market, Gritzmaker loaned Xanaro $55,000.

And for a short time last year the company was listed on the Vancouver, B.C., stock exchange as the result of Hryniak's friendly reverse takeover of Paramount Resources, a public gold mining company based in British Columbia. Xanaro acquired 50.4% of Paramount stock for all of its own equity, thus taking Xanaro public in the process. But the deal fell apart in September when auditors revealed Xanaro's debts to be $3.2 million, not the $550,000 reported in Xanaro's unaudited statements before the takeover. During that takeover attempt, Xanaro was even looking into acquiring other companies, according to Hryniak.

"If it happens that we can get our $1.45 million back, we will be happy," said an executive at Noramco Capital Investments Corp., the current owner of Paramount. Noramco loaned Hryniak's firm that amount to finance ongoing operations while negotiating the reverse takeover.

Receivership has dramatically altered Xanaro's management structure. As part of the receivership plan, Hryniak has been forced from the firm's Toronto office, leaving his future role at Xanaro in doubt. Gritzmaker and Michael Bird, hired as director of corporate accounts, have been appointed agents for the company and are in control of Xanaro's U.S. subsidiary.

Xanaro's future decided at hearing

The future of Xanaro will be decided later this week at a hearing before the Ontario Supreme Court. Based on the court's decision, the firm may be sold, its assets, essentially the Ability source code, may be sold or it may be allowed to operate as is, Xanaro's Bird said.

Observers said they believe that if the court sells the source code, it will be without the buyer carrying liability for the firm's debt. "The source code will be the deal of the century. Xanaro in the U.S. is clear of everything," said an official at Ronalds & Reynolds, a Toronto-based marketing and advertising firm and one of Xanaro's creditors.

The most likely outcome will be the sale of Xanaro source code to Gritzmaker. "I fully expect to purchase the source code," Gritzmaker said. The sale of the source code would include that of Ability II, an enhanced version of the product that had been in development.

If the court sells Ability source code to Gritzmaker, he will market the product through a U.S.-based software company that is publicly traded in Canada. Gritzmaker was to have been named president of that company late last week, but he refused to identify the firm.

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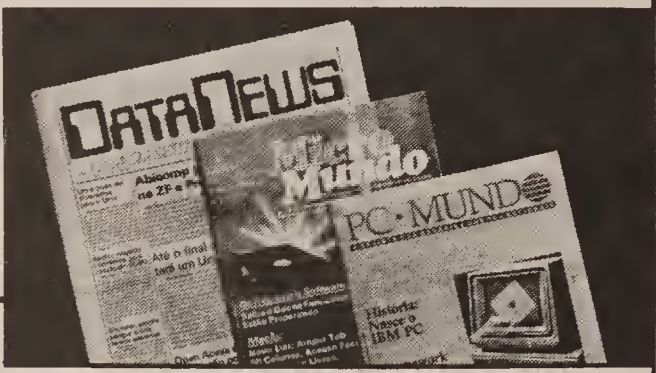

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The Classified section of the newspaper is laid out in an attractive format and is easy to read. It offers classifications to solve a variety of problems:

Position Announcements, Buy • Sell • Swap,
Software For Sale, Software Wanted,
Time & Services, Bids & Proposals,
Business Opportunities, Real Estate,
Auctions, Positions Wanted, Seminars &
Conferences, Publications and **The Bulletin Board**

Our BULLETIN BOARD section is ideal for the smaller companies who want a low-cost way to sell pieces of equipment (hardware or software). The BULLETIN BOARD is laid out as a quick reference for potential buyers who know what they are after.

So, as a nationwide publication, we give you the exposure you want. As a weekly publication, we give you the immediacy your advertisements need.

A number of Executive Reports and Product Spotlights are scheduled to run in **COMPUTERWORLD** during 1986. Each of these features will focus on one aspect of the computer industry and give our advertisers a chance to reach a more select audience. These are some of the topics the features will cover:

Executive Reports

- Feb 3 - **Unix**
- Feb 10 - **DP as a Profit Center**
- Feb 24 - **Application Software Development**
- Mar 3 - **Mass Storage Systems**
- Mar 17 - **Managing Voice & Data Communications**
- Mar 24 - **Personal Computer Networks**
- Apr 28 - **Software Maintenance**

Product Spotlights

- Jan 27 - **Manufacturing Software**
- Feb 17 - **2400 bit./sec. Modems**
- Mar 10 - **32-bit Workstations**
- Mar 31 - **Mainframe & Mini DBMS**
- Apr 21 - **Non-Impact Printers**
- May 12 - **Disaster Recovery**
- June 2 - **Word Processing Software**
- June 23 - **Personal Computer Graphics**

COMPUTERWORLD publishes every Monday with an ad deadline of 10 days prior to each issue date. The issue of February 3rd will be closing January 24th. You may send in copy to be pubset or camera-ready material (velox or negative) via the mail. We provide telecopier service and will also take ads over the phone.

Information concerning classified advertising rates, color costs, ad sizes, mechanical specifications along with more detailed information on the special issues is contained in the 1986 Rate Card #21 and Media Kit. Or from our offices.

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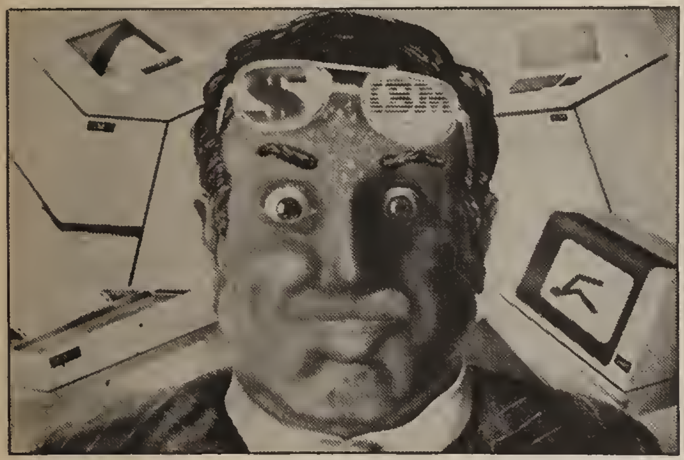

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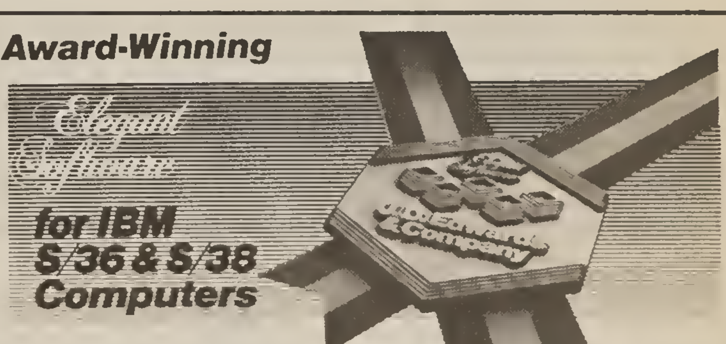

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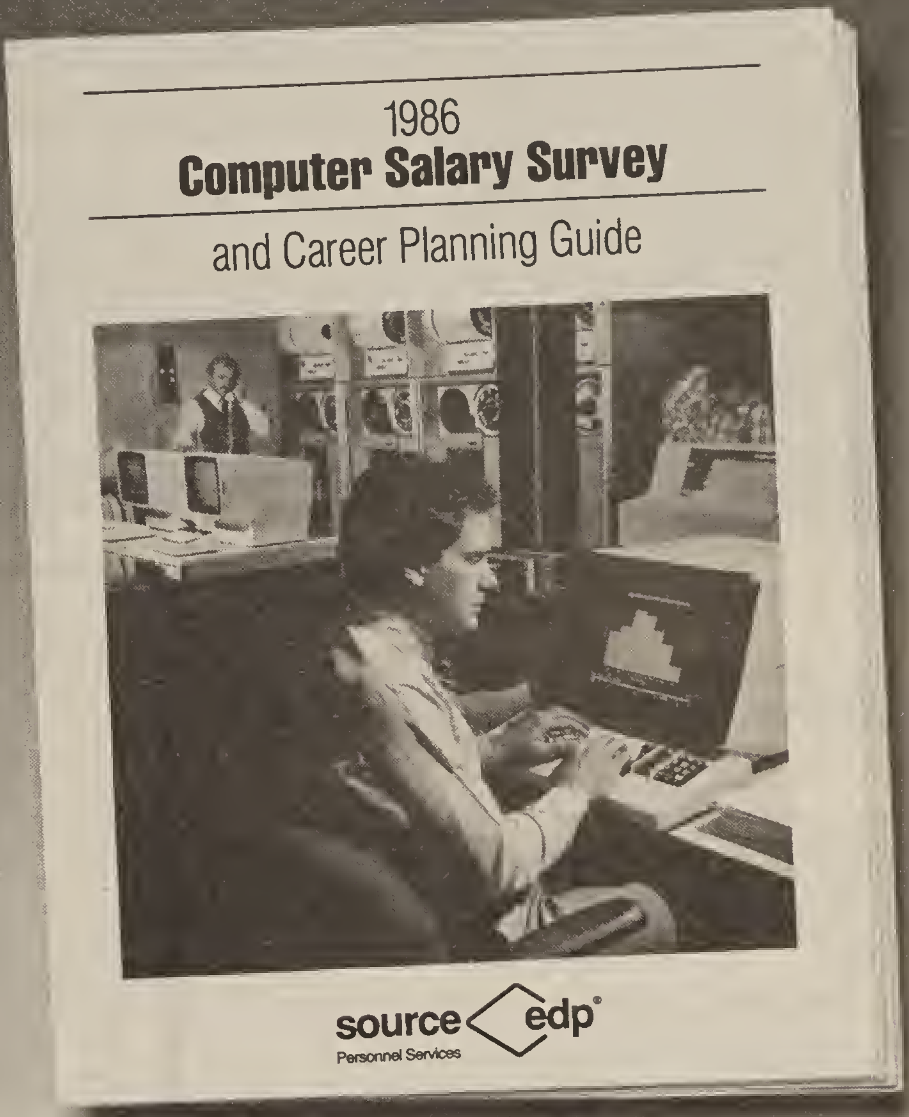

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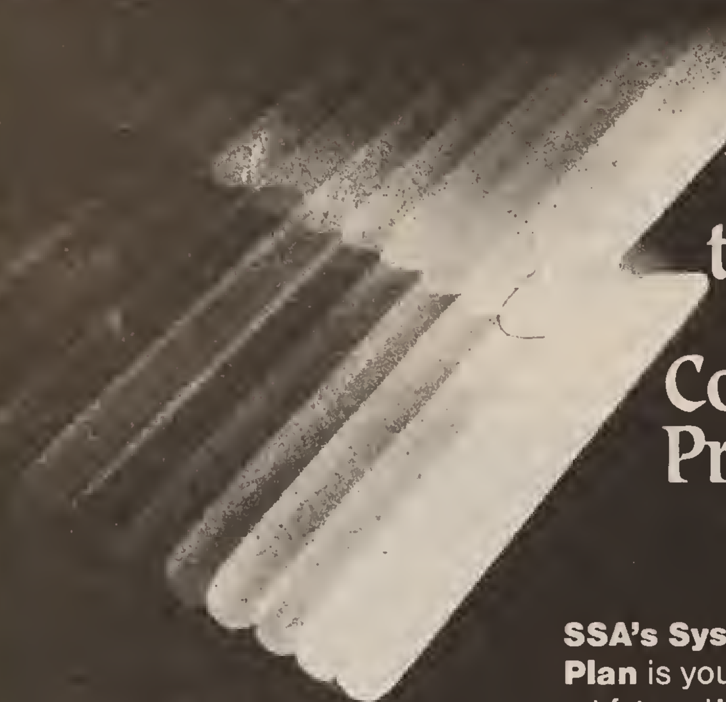

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Personnel Office
Polk County Board
of County Commissioners
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Bartow, FL 33830
EOE M/F/H

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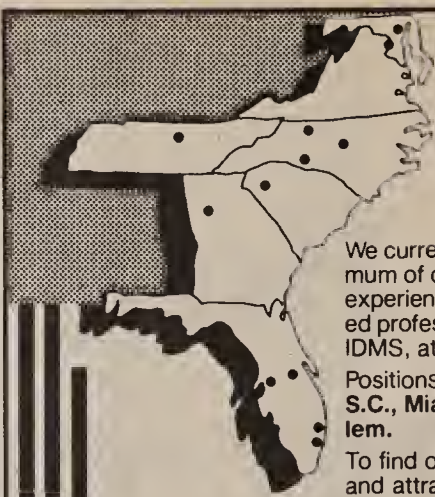

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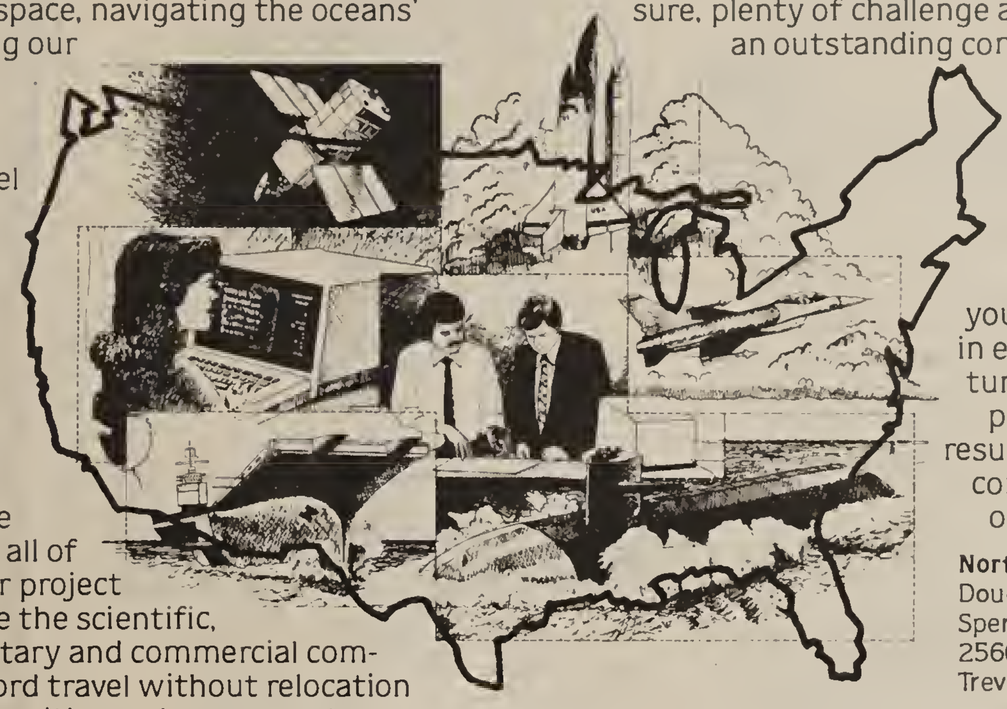

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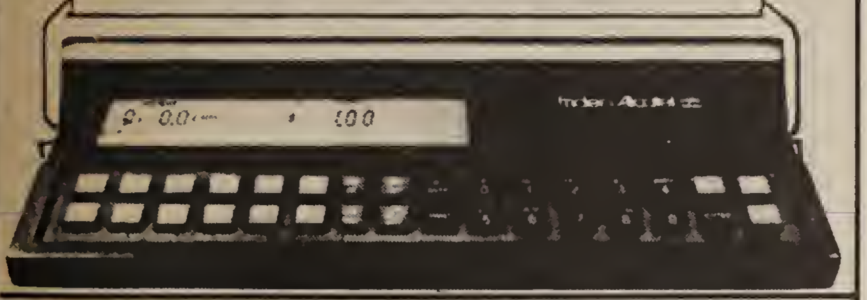

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DATA PROCESSING

Geisinger

Analysts/ Programmers

State-of-the-art challenges in a centralized DP environment. Due to growth within our department, we have immediate openings for a number of qualified analysts/programmers. Check off your technical and applications experience below and compare it with the opportunities we have to offer. Do we have a match? We're interested in you!

TECHNICAL

__ COBOL
__ CICS
__ MVS
__ TSO/ISPF
__ OS/JCL
__ IBM Utilities
__ VSAM
__ System 2000
__ IMS
__ FOCUS
__ Information Expert

APPLICATIONS

__ Clinical Scheduling
__ Admission/Discharge Transfer System
__ Patient Accounting
__ Order Entry/Order Communication
__ Healthcare Applications
__ MSA
__ General Ledger
__ Human Resources
__ Inventory/Purchasing
__ Accounts Payable
__ Fixed Assets

I have __ years as a programmer.
I have __ years as an analyst/programmer.
__% time spent programming.
__% time spent as an analyst.
I do/do not enjoy extensive user contact.

Geisinger System Services

...is located in scenic central Pennsylvania and offers a pleasant, affordable lifestyle. We offer an excellent compensation/benefits package including relocation. To be considered, complete this ad, attach a resume including salary history/requirements to: Human Resources Department 30/12V, GEISINGER SYSTEM SERVICES, Danville, PA 17822. E/O/E/M/F/H.

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Immediate opening on our Technical Support Team for a MVS/XA Systems Programmer capable of the installation, maintenance and support of our dual IBM 4381 CPU environment and 300+ SNA terminal network. The Information Systems Department of Saint Marys Hospital, an 1150-bed teaching hospital affiliated with the Mayo Clinic, is an industry leader in information processing technology and presents a challenging career opportunity in a modern state-of-the-art environment for the technically-oriented data processing professional. Applicants should possess at least 4 years experience in MVS operating systems, JES, CICS, VSAM and Assembler Language. Additional experience in DL/1, ACF/-VTAM, ACF/NCP, DOS/VSE or VM/SP is very desirable.

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Systems Programmers OS/MVS

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VAX VMS. Basic. Programmers 3-4 yrs exp.

IDMS ADSO Applications

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R-H ®

Application Programmer Analysts

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S/38

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Systems Programmer
To $35K

We are a transportation company with over 4,000 employees operating in the midwest. Our needs are to fill two existing Systems Programmer positions in our headquarters office in downtown Detroit. We want to hear from you if you possess the following:

* 1-2 years support CICS with OS/VS2
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- Provide technical and administrative support for Design Engineering Division's Computer Integrated Manufacturing Integration Task Force and for WX-12 personnel in areas of drafting and manufacturing technology.
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Requirements:

- Broad background in CAD, computer-aided engineering (CAE), and computer-aided manufacturing (CAM) with ability to implement practical solutions to CIM integration problems.
- Knowledge of IBM, DEC, and/or CDC computer hardware and software required. Working knowledge of at least one CAD system required. CD 2000 experience preferred.
- Proven ability to communicate effectively with all levels of technical and administrative personnel is mandatory. Bachelor's in mathematics, engineering, or computer science or equivalent combination of education and experience.
- U.S. citizenship is required.

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LOS ALAMOS

SYSTEMS PROGRAMMERS NEW DATA CENTER

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Computer Systems Professionals

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Staffing requirements call mainly for systems oriented Engineers and Systems Programmer/Analysts with in-depth expertise in CDC 205 and VAX 8600 configurations featuring:

- *Remote wideband data networks including satellite and LAN*
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Highly preferred is an advanced degree in Computer Science or Electrical Engineering and current Supercomputer/VAX Cluster experience.

In addition to outstanding professional opportunities, ZeroOne offers relocation and competitive compensation/benefits. Send your resume in confidence to: Attention JVNC/hh.

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- office automation applications
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Bachelor's deg. in Math. or Comp. Sc., plus 5 yrs. exp. in above or 5 yrs. exp. in software design/dev. At least 3 yrs. exp. in the use of IBM mainframes; the VM, DOS & CICS Systems; the computer lang. IBM ASSEMBLER & COBOL; and text mgt., inc. Indexing, storing & retrieval of full text, using IBM software package prod. STAIRS. Must have 2 yrs. managerial exp. in the field.

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TRW

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Position leads Business Systems applications project for Sales/Marketing Division. Successful candidate will possess BS or equivalent, and 8 years experience with technical skills in complex database and application design and development. Also required are effective interpersonal skills for user interface and a favorable project management track record.

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BS or equivalent; 6 years programming experience, including proven skills in COBOL and DBMS (IDMS preferred) within a manufacturing environment.

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RACAL
The Electronics Group

Programming

Sr. Programmer Analyst

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Community Hospitals Of Central California

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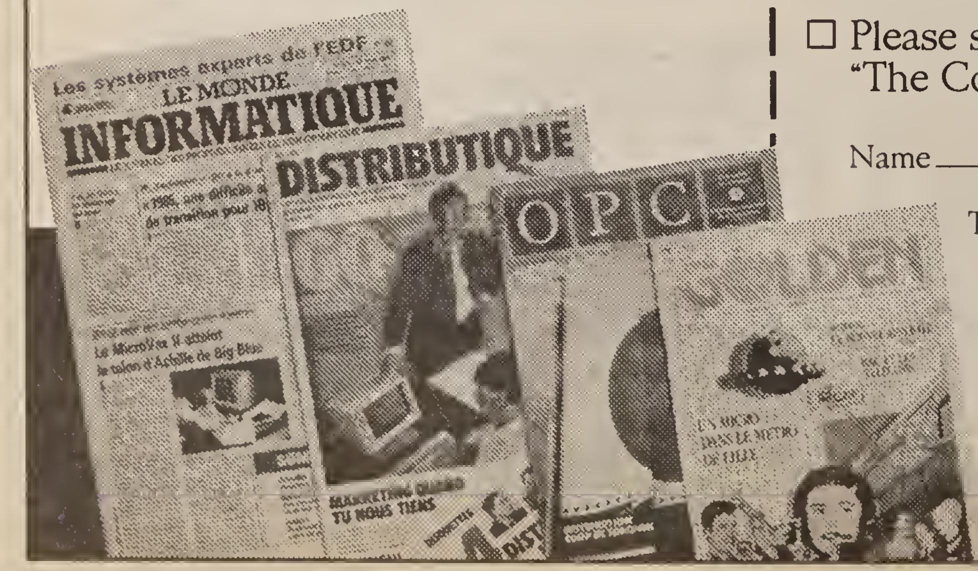

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IBM final quarter not strong enough

From page 146

the prior year to $2.68 billion, or $4.36 per share. Sales, bolstered by shipments of the high-end 3090 Model 200 mainframe known as Sierra, rose 18.4%, from $14.49 billion to $17.15 billion.

Generally positive results from other computer vendors, including Wang Laboratories, Inc., Honeywell, Inc. and NCR Corp., indicated that orders were on the rebound in the fourth quarter, but the financial community cited several factors for the improvement. "Many customers had money left in the budget or got some year-end purchases in for tax purposes," said Peter Labe of Drexel Burnham Lambert, Inc. "Companies with strong product lines seem to be doing quite well. I think the industry is on the eve of turning the corner in 1986. It won't be a boom, but recovery is in the air."

The same could not be said for the semiconductor industry, despite the rise of December's book-to-bill ratio to 0.98, its highest level in more than a year. Intel Corp. announced a $15 million fourth-quarter loss, its largest ever, and 700 new layoffs. Intel had previously cut some 400 jobs due to its departure from the low-end dynamic random-access memory market.

Advanced Micro Devices, Inc. reported an operating loss of $17.7 million, but it was less than the $29.5 million loss from operations in the previous quarter.

Among systems vendors, DEC rode growing sales of its Microvax II and VAX 8600 machines, as well as improved profit margins, to a 23% profit rise over its second fiscal quarter a year ago. Net income was $136.1 million, or $2.17 per share, compared with $110.3 million, or $1.81 per share, a year ago.

Revenue grew at a slower rate of 14%, from $1.63 billion a year ago to $1.86 billion. The profit growth was due mainly to a 9.7% operating margin, up from 8.6% a year ago and from 6.1% in DEC's traditionally slow first quarter.

"DEC is a classic example of rebounding from what happened in 1985," Labe said. "Going into the year people thought there would be growth forever, then expectations crashed and companies all shrunk their cost structures. DEC's showing is evidence of strong products and good cost control."

■ **Honeywell.** The Minneapolis-based mainframe, office automation and defense systems vendor reported a 9.6% gain in adjusted profits from the year-earlier fourth quarter to $121 million, or $2.64 per share. Revenue grew 15.9% to $2.03 billion from $1.75 billion a year ago.

For the year, Honeywell's profits from continuing operations fell 17.8% from $334.8 million, or $6.29 per share, in 1984 to $275.4 million, or $6.02 per share. Revenue grew 9.1% to $6.62 billion from $6.07 billion. Chairman and Chief Executive Officer Edson W. Spencer called the results "satisfactory, considering the lackluster performance of industrial and computer markets."

Honeywell reported slight gains in its Information Systems division's business for the year. Revenue grew 6.9% to $1.95 billion, and earnings from continuing operations jumped 11.1% to $200 million. Spencer cited improved margins due to cost controls and strong large systems orders, while noting that the small computer market continues to be soft.

■ **NCR.** The Dayton, Ohio-based vendor cited a weaker dollar and improved orders for a 7.5% profit jump from the year-earlier quarter to $133.2 million, or $1.34 per share. Sales rose 11.9% to $1.41 billion.

■ **Wang.** The office automation leader posted its second straight profitable quarter after its staggering $109 million loss last spring, but its results still lagged far behind the year-earlier period. Wang earned $21.7 million or 15 cents per share, compared to $56.3 million or 40 cents per share a year ago. Sales rose 11.4% from $610 million to $679.5 million.

■ **Apple.** The Cupertino, Calif., microcomputer vendor led off its major product announcement week (see story on page 1) by reporting a surprising 23% jump in profits on a 23% decline in sales. The firm's previous layoffs and highly publicized reorganization contributed to improved margins, while its sales drop was attributed to price cuts and inventory adjustments.

For the first quarter ended Dec. 31, Apple earned a record $56.9 million, or 91 cents per share, on $533.9 million in revenue. A year ago, the firm earned $46.1 million, or 75 cents a share, on sales of $698.3 million.

Investors eye data storage

ACTIVE ISSUES
Kathy Porteus

After a year of investor wariness, now may be the time for a second look at the data storage industry.

The storage market, like other sectors of the computer peripherals industry, generally rides the coattails of the computer systems hardware market. "If the computing industry has any kind of pickup in 1986, peripheral companies will benefit," says Ron Elijah, analyst with Robertson, Colman & Stephens.

Of the storage companies he covers, Elijah predicts Cipher Data Products, Inc. (over-the-counter — 17¾), Emulex Corp. (OTC — 11⅛), Quantum Corp. (OTC — 24½), Seagate Technology, Inc. (OTC — 7⅞) and Xidex Corp. (OTC — 15) will "best benefit from a turn in the computer industry." Elijah says, "The computing industry in 1986 can improve 8% to 10% over 1985 results."

More optimistic is James Stone, vice-president with Shearson Lehman Brothers, Inc. Stone says he expects the disk drive industry "to grow at least 20% in 1986, and some of the disk drive companies are going to see even faster growth." Stone says, "the improvement in the storage industry has already happened, if you look at the numbers." According to Stone, the eight disk manufacturers tracked by Shearson Lehman shipped approximately $360 million worth of drives in the December 1985 quarter, which is a record.

Stone says he is most bullish, of the disk drive suppliers, on Seagate, Priam Corp. (OTC — 5⅜) and Micropolis Corp. (OTC — 9⅞).

Propelling Micropolis, which Stone says had 50% revenue growth between its September and December quarters, is the surge in the market for 85M-byte drives, which account for about 90% of the company's business. Priam, which is also a supplier of high-capacity Winchester drives, has greater product diversification than does Micropolis and is therefore less exposed to negative events occurring in a single market segment.

Stone estimates Micropolis will earn 80 cents per share in its 1986 fiscal year ending Dec. 31, and Priam will earn 50 cents to 60 cents per share in calendar year 1986.

According to Stone's estimates, Seagate is trading at about eight times calendar 1986 earnings of 80 cents to 90 cents per share. Seagate's valuation is 30% below that of other disk drive companies whose stocks are currently valued 30% below other technology stocks.

Elijah of Robertson Colman agrees that "the appreciation potential of Seagate is probably greater now than for other storage companies. Seagate's gross margins are improving, and it could break even or make a few cents for the December 1985 quarter."

On the tape side of the storage industry, Cipher attracts attention. John Rutledge, vice-president of research for Dillon, Read & Co., says, "Cipher has a good institutional following, a lot of credibility and a lot of price support because many people who don't own Cipher want to own it at the right time."

Rutledge has recommended Cipher since the summer, when the ½-in. streaming tape drive maker was suffering most from softness in the minicomputer industry. Rutledge estimates the company will earn $1.35 a share in fiscal 1987, compared with his earnings estimates of 75 cents per share in fiscal 1986, ending June 30.

"Cipher should see some improvement but not like the company has experienced in the past," Elijah says. "Cipher's recovery is like going to a party and getting a hangover. It takes a while to get over it."

Porteus is president of Strand Research Associates, a Centerville, Mass.-based company that provides customized research services for financial and high-tech firms.

GTE, United Telecom hook up in long-distance alliance

Sprint, U.S Telecom create No. 3 carrier

By Bryan Wilkins

GTE Corp. and United Telecommunications, Inc. last week agreed to form a partnership combining GTE subsidiaries GTE Sprint Communications Corp. and GTE Telenet Communications Corp. with United Telecom's U.S. Telecom and Uninet, Inc.

The new company, to be called U.S. Sprint Communications Co., will form the third largest long-distance carrier behind AT&T Communications and MCI Communications Corp., with about 4% of the market.

GTE will absorb a one-time write-down of $1.3 billion in assets, reflecting the reduction of Sprint assets transferred to U.S. Sprint and the separately announced merger of its office transmission and switching gear business with that of Siemens Communication Systems, Inc. in the U.S. United Telecom will contribute an additional $230 million in capital to reflect the lesser value of the assets it is transferring to U.S. Sprint.

Merger must be approved

The planned merger of the two companies' long-distance data and voice communications divisions must be approved by the U.S. Department of Justice and the Federal Communications Commission. Approval is expected by July 1986.

U.S. Sprint Communications will initially be an integration of U.S. Telecom and GTE Sprint's voice network and Telenet and Uninet's data network. However, according to officials of both companies, the backbone of the new carrier will be the fiber-optic network already under construction by U.S. Telecom and Uninet.

Paul Henson, chairman of United Telecom, and Theodore Brophy, chairman and chief executive officer of GTE, denied that the merger signifies the failure of the two companies to compete with AT&T in the deregulated long-distance market. They acknowledged, however, that the realities of the market are difficult.

Sprint losses

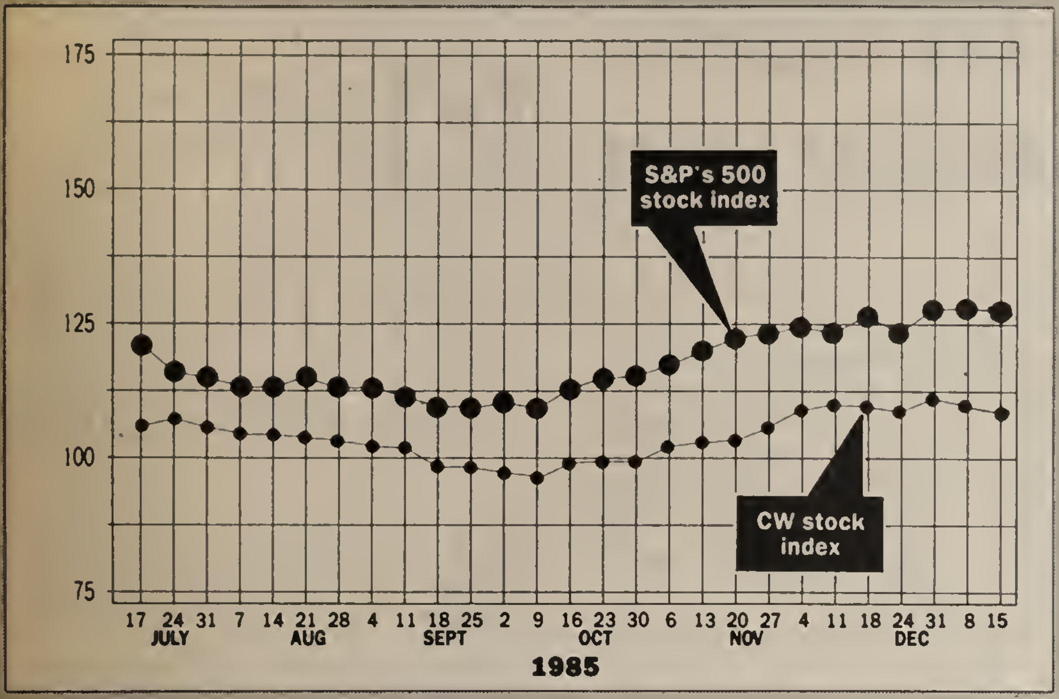
According to analysts, Sprint is losing approximately $100 million per quarter after spending $2.9 billion on facilities and a plant since it was acquired by GTE from Southern Pacific Co. in 1983.

"This is a beneficial move for both companies," said Frank Governali, telecommunications analyst for Kidder, Peabody & Co.

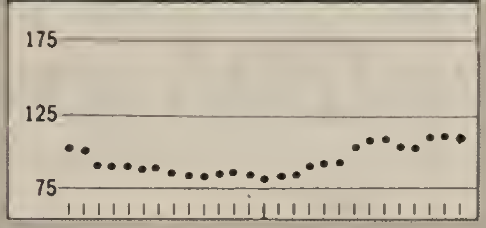
"I don't think they were having much success going it alone, and with this move, their chances of success in long distance are much greater," Governali said.

MITCHELL J. HAYES

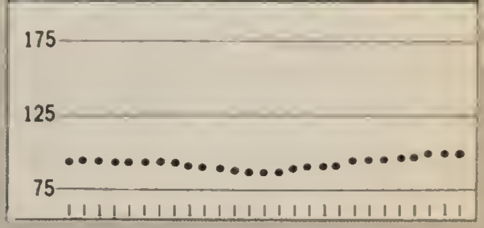
Computerworld stock trading index



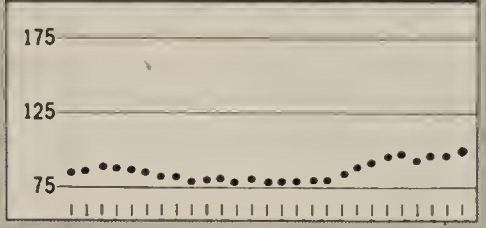
Computer systems



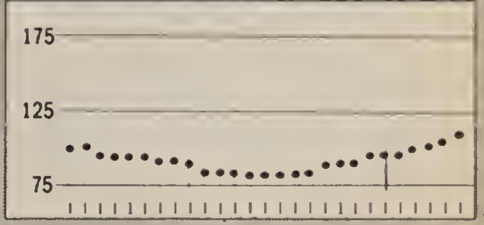
Software and DP services



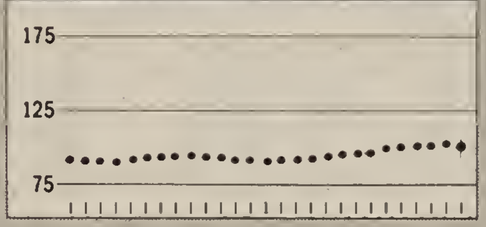
Semiconductors



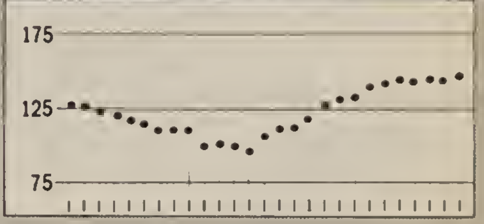
Peripherals and subsystems



Leasing companies



Supplies and accessories



All indexes reflect a historical base of 100 on Dec. 31, 1984, and trace stock market performance in relation to that base. The CW stock index represents the unweighted average performance of the six categories of computer industry stocks.

	As of 1/15/86	As of 1/8/86
Software and DP services	**104.1**	**104.1**
Supplies and accessories	**132.1**	**135.8**
Leasing companies	**102.7**	**103.0**
Peripherals and subsystems	**104.0**	**105.7**
Computer systems	**114.3**	**114.4**
Semiconductors	**103.0**	**102.6**
CW stock index	**110.2**	**111.0**
Standard and Poor's 500 stock index	**124.5**	**124.4**

Computerworld stock trading summary

CLOSING PRICES WEONESOAY, JANUARY 15, 1986

COMPUTER SYSTEMS

EXCH		PRICE 52-WEEK RANGE (1)	CLOSE JAN 15 1986	WEEK NET CHNGE	WEEK PCT CHNGE
O	ALPHA MICROSYSTEMS	5- 9	5 3/4	-3/8	-6.1
O	ALTOS COMPUTER SYST	9- 14	13 5/8	0	0.0
A	AMOAHL CORP	10- 18	14	+1/0	+0.9
O	APPLE COMPUTER INC	14- 31	23 7/8	+1	+4.3
O	APPOLLO COMPUTER	9- 31	12 3/4	-1/4	-1.9
N	AT&T	19- 28	23 5/8	-3/4	-3.0
N	8URROUGHS CORP	52- 68	62 3/8	+1/8	+0.2
O	COMPAQ COMPUTER CP	5- 14	12 3/4	-1/2	-3.7
O	COMPUTER AUTOMATION	1- 9	2 5/8	-1/4	-8.6
A	COMPUTER CONSOLES	5- 14	7 1/4	+1/8	+1.7
N	CONTROL OATA CORP	15- 39	21 1/2	1/8	+0.5
O	CONVERGENT TECHNOL	5- 13	13	-3/8	+2.9
O	CPT CORP	5- 8	6 3/8	-3/8	-5.5
N	CRAY RESEARCH INC	25- 71	61 5/8	-1/8	-0.2
O	OAISY SYSTEMS CORP	21- 38	25 1/4	-2 1/4	-8.1
N	OATA GENERAL CORP	31- 76	45 3/8	+2 1/2	+5.8
N	OATAPOINT CORP	5- 22	5 1/4	-1/8	-2.3
N	OIGITAL EQUIPMENT	85- 142	141 3/4	+8 1/4	+6.1
A	EECO INC	13- 16	15	+1/4	+1.6
N	ELECTRONIC ASSOC.	3- 6	4 5/8	0	0.0
N	FLOATING POINT SYST	18- 37	33	-1/2	-1.4
N	FOX8ORO	22- 31	25 7/8	-3/4	-2.8
N	GOULO INC	20- 38	29 3/4	-1/8	-0.4
N	HARRIS CORP	22- 35	26	-3/4	-2.8
N	HEWLETT-PACKARO CO	29- 39	38 3/8	+1 3/8	+3.7
N	HONEYWELL INC	54- 87	77 1/2	+5	+6.8
N	I8M	117- 156	152 5/8	+3 3/4	+2.5
O	IPL SYSTEMS INC	1- 4	1 3/8	-1/4	-15.3
N	ITT CORP	28- 38	38 1/4	+1/2	+1.3
N	M/A-COM INC	13- 24	14 1/8	+1/4	+1.8
N	MANAGEMENT ASSIST	2- 28	2 7/8	-3/8	-11.5
N	MATSUSHITA ELEC(AOR)	49- 68	62	-1/8	-0.2
O	MENTOR GRAPHICS	13- 30	15 3/4	-1 3/8	-8.0
N	MOOULAR COMPUTER SYS	6- 8	6 7/8	0	0.0
N	MOHAWK OATA SCI	1- 13	2 1/8	-1/4	-10.5
N	N8I INC	11- 20	12 1/4	+1/8	+1.0
N	NCR	25- 43	41 7/8	+1 3/4	+4.3
N	PERKIN-ELMER	22- 31	30 1/4	+1/4	+0.8
N	PRIME COMPUTER INC	15- 24	23 1/2	+1 1/4	+5.6
N	SPERRY CORP	39- 59	50 1/4	-1 3/4	-3.3
O	STRATUS COMPUTER INC	9- 25	22 5/8	+5/8	+2.8
O	TANOEM COM PUTERS INC	13 -29	20 7/8	+5/8	+3.0
N	TANOY CORP	24- 42	40 3/8	+7/8	+2.2
O	TELEVIOEO SYSTEMS	2- 4	3 1/8	+1/8	+4.1
O	TELXON CORP	10- 23	22 3/4	-1/8	-0.5
N	TEXAS INSTRUMENTS	86- 132	108 1/8	+4 1/8	+3.9
A	ULTIMATE CORP	8- 26	26 1/8	+1 7/8	+7.7
O	VECTOR GRAPHICS INC	0- 1	1/8	0	0.0
●	WANG LA8S "B"	15- 29	19 1/2	+1 1/2	+8.3
A	WANG LA8S "C"	15- 29	19 3/4	+5/8	+3.2
N	XEROX CORP	37- 61	60 1/2	+1 3/4	+2.9

LEASING COMPANIES

EXCH		52-WEEK RANGE (1)	CLOSE JAN 15 1986	WEEK NET CHNGE	WEEK PCT CHNGE
N	COMOISCO INC	10- 29	22	-6 1/4	-22.1
N	CONTINENTAL INFO SYS	5- 15	14 7/8	-1/8	-0.8
O	FINALCO GROUP INC	4- 5	4 1/4	0	0.0
O	PHOENIX AMERICAN INC	2- 4	3 7/8	+1/2	+14.8
O	SELECTERM INC	7- 12	7	-1/4	-3.4
N	U.S. LEASING	32- 43	39 1/2	-7/8	-2.1

EXCH: N = NEW YORK; A = AMERICAN; P = PACIFIC; 8 = 8OSTON;
L = NATIONAL; M = MIDWEST; O = OVER-THE-COUNTER
O-T-C PRICES ARE BIO PRICES AS OF 3 P.M. OR LAST 8IO
(1) TO NEAREST DOLLAR

SEMICONOUCTORS

EXCH		PRICE 52-WEEK RANGE (1)	CLOSE JAN 15 1986	WEEK NET CHNGE	WEEK PCT CHNGE
N	AOVANCEO MICRO OEV	22- 36	28	+1 1/8	+4.1
O	AOV'O SEMICONOUCTOR	7- 23	9	0	0.0
N	ANALOG OEVICES INC	18- 28	26 1/4	+7/8	+3.4
O	ANALOGIC CORP	11 -16	13 5/8	-1 1/8	-7.6
N	APPLIEO MAGNETICS CP	9- 17	17	+1/2	+3.0
O	AVANTEK	18- 26	19 1/8	-7/8	-4.3
O	HAOCO CORP	3- 7	6 1/8	0	0.0
O	INTEL CORP	21- 33	28 3/8	+1 5/8	+6.0
O	MICRO MASK INC	6- 12	6 3/4	0	0.0
N	MOTOROLA INC	29- 41	37 3/8	+7/8	+2.3
N	NAT'L SEMICONOUCTOR	10- 15	12 7/8	+1/4	+1.9
N	TERAOYNE	17- 33	21 5/8	-7/8	-3.8

SOFTWARE & EOP SERVICES

EXCH		52-WEEK RANGE (1)	CLOSE JAN 15 1986	WEEK NET CHNGE	WEEK PCT CHNGE
O	AOVANCEO COMP TECH	2- 4	3 3/4	-3/8	-9.0
N	AOVANCEO SYSTEMS INC	9- 18	16 7/8	-3/8	-2.1
N	AGS COMPUTERS INC	10- 24	21 7/8	-1 3/4	-7.4
O	AMERICAN SOFTWARE	9- 15	14	+1/2	+3.7
N	ANACOMP INC	2- 4	3 3/4	+1/8	+3.4
O	ANALYSTS INTL CORP	5- 11	7 1/2	-1/4	-3.2
N	APPLIEO OATA RES	16- 38	31 7/8	0	0.0
O	ASHTON TATE	6- 20	19 1/4	-1/2	-2.5
O	ASK COMPUTER SYSTEMS	7- 25	13	0	0.0
8	ASTRAOYNE COMP INO	1- 3	2	0	0.0
N	AUTOMATIC OATA PROC	35- 60	58 3/4	-1/8	-0.2
O	COMPUTER NETWORK	5- 9	5 3/8	-1/8	-2.2
O	COMPUTER ASSOC INT'L	18- 35	33 3/4	-1/2	-1.4
O	COMPUTER HORIZONS	5- 11	10 1/2	-5/8	-5.6
N	COMPUTER SCIENCES	13- 34	33 1/4	+1 3/8	+4.3
O	COMPUTER TASK GROUP	10- 24	21 3/4	+1/2	+2.3
O	COMPUTER USAGE -	1- 3	1 5/8	0	0.0
O	COMPUTONE SYSTEMS	4- 11	5	0	0.0
O	COMSERV CORP	1- 6	3 1/2	0	0.0
O	COMSHARE	7- 12	11	+1/8	+1.1
N	CULLINET SOFTWARE	13- 33	18	0	0.0
O	CYCARE SYSTEMS INC	19- 27	21 1/4	0	0.0
O	HOGAN SYSTEM INC	4- 12	8 1/4	+1	+13.7
N	GENERAL ELECTRIC CO	56- 74	68 1/4	-2 1/2	-3.5
N	GENL MOTORS E (EOS)	20- 47	37 1/4	-5/8	-1.6
N	GTE CORP	38- 47	47 1/8	+3/8	+0.8
O	INFORMATION SCIENCE	1- 5	1 7/8	+3/8	+25.0
O	INFOTRON SYSTEMS CP	13- 24	16	-1 1/2	-8.5
O	KEANE ASSOCIATES	10- 20	15	0	0.0
N	LOGICON	25- 43	39	-3/4	-1.8
O	LOTUS OEVELOPMENT CP	15- 34	24 1/2	+3/4	+3.1
O	MCI COMMUNICATIONS	7- 12	12	+1 1/8	+10.3
O	MNGT SCI AMER INC	7- 16	12 1/2	+1	+8.6
O	MATHEMATICAL APP GRP	1- 8	1 7/8	-1/8	-6.2
O	MICOM SYSTEMS INC	12- 35	20	0	0.0
O	MICROPRO INT'L CP	2- 4	2 1/2	-1/16	-2.3
O	NATIONAL OATA CORP	8- 18	17 1/2	-1/4	-1.4
O	ON-LINE SOFTWARE INT	4- 11	10 1/4	-3/4	-6.8
O	PANSOPHIC SYSTEMS	14- 27	25 3/4	+1 3/4	+7.2
N	PLANNING RESEARCH	11- 19	15 3/8	-1/2	-3.1
O	POLICY MGMT SYSTS CP	17- 35	22 1/2	-1/2	-2.1
O	PROGRAMMING & SYS	4- 9	7 3/4	-1/4	-3.1
O	REYNOLOS & REYNOLO	31- 57	51 1/2	-2 3/4	-5.0
O	SEI CORP	13- 26	25 1/2	+1/2	+2.0
O	SHAREO MEOICAL SYST	26- 37	32 5/8	-2	-5.7
O	SCIENTIFIC COMPUTERS	5- 8	5 1/4	-1/4	-4.5
O	SOFTWARE AG	12- 22	18 3/4	+1 1/2	+8.6
N	URS CORP	10- 14	12 1/4	-3/8	-2.9
N	UCCEL	11- 17	16 3/8	-1/4	-1.5
O	VM SOFTWARE	17- 24	21 3/4	+1	+4.8

PERIPHERALS & SU8SYSTEMS

EXCH		PRICE 52-WEEK RANGE (1)	CLOSE JAN 15 1986	WEEK NET CHNGE	WEEK PCT CHNGE
P	AM INTERNATIONAL	3- 6	5 3/4	-1/8	-2.1
A	ANOERSON JACO8SON	2- 5	2 1/4	+1/8	+5.8
O	AST RESEARCH INC	7- 33	25	-4 1/4	-14.5
O	AUTO-TROL TECHNOLOGY	3- 13	4 3/4	-5/8	-11.6
O	AVANT-GAROE COMPUTNG	3- 21	4 3/4	-1	-17.3
O	BANCTEC INC	6- 12	8 7/8	+5/8	+7.5
O	8EEHIVE INT'L	1- 2	1/8	0	0.0
N	8OLT,8ERANEK & NEW	20- 37	33 7/8	-1 1/2	-4.2
O	CAM8EX CORP	1- 3	7/8	0	0.0
N	CENTRONICS OATA COMP	3- 11	4 7/8	+1/4	+5.4
A	CETEC CORP	6- 9	7 1/8	-1/8	-1.7
A	COGNITRONICS	4- 7	4 3/8	-1/8	-2.7
N	COMPUGRAPHIC CORP	24- 36	27	0	0.0
O	COMPUTER TRANSCEIVER	0- 1	3/8	-1/8	-22.2
N	COMPUTERVISION CORP	9- 44	12	0	0.0
N	CONRAC CORP	12- 17	16 3/4	+1 1/8	+7.1
A	OATAPROOUCTS CORP	11- 20	15 3/8	-1/2	-3.1
A	OATARAM CORP	4- 9	8 1/2	+1/8	+1.4
O	OATA SWITCH CORP	4- 9	6	-1/4	-4.0
O	OATUM INC	5- 9	5 1/2	+1/8	+2.3
O	OECISION OATA COMPUT	10- 20	12 1/2	-1/8	-0.9
O	ENOATA, INC	2- 8	4 1/2	+1/4	+5.8
O	EVANS & SUTHERLANO	12- 21	18 1/2	+1/2	+2.7
O	GANOALF TECHNOLOGIES	5- 13	6 1/8	-3/4	-10.9
N	GEN'L DATA COMM INO	8- 21	11 5/8	+1/2	+4.4
N	HAZELTINE CORP	20- 30	24 3/4	-3/4	-2.9
O	ICOT CORP	3- 9	8 1/2	+1/4	+3.0
O	INFORMATION INTL INC	10- 17	12 7/8	-5/8	-4.6
O	INTECOM INC	4- 11	5 5/8	+3/8	+7.1
A	LUNOY ELECTRONICS	10- 15	13 3/8	+1/2	+3.8
O	MEGAOATA CORP	3- 8	4 3/8	-3/8	-7.8
A	MSI OATA CORP	7- 13	10 7/0	-5/8	-5.4
N	NASHUA CORP	24- 32	31 7/8	+3/4	+2.4
O	NETWORK SYSTEMS CORP	14- 27	14 1/4	-3/8	-2.5
N	NO AMERICAN PHILIPS	32- 45	37	-1/4	-0.6
N	NORTHERN TELECOM LTO	31- 41	32 5/8	+3/8	+1.1
O	OMEX	1- 3	1/2	0	0.0
N	PARAOYNE CORP	7- 18	7	-1/8	-1.7
A	PENRIL CORP	7- 14	8 5/8	+1/8	+1.4
N	PLESSEY CO (AOR)	19- 28	24	-1 1/2	-5.8
O	PRINTRONIX INC	9- 18	12 7/8	-1/8	-0.9
O	QMS INC	6- 16	10 1/2	+7/8	+9 0
O	RAMTEK CORP	2- 7	3 1/4	0	0.0
N	RECOGNITION EQUIP	9- 17	15 1/4	0	0.0
N	SANOERS ASSOCIATES	30- 44	35	0	0.0
O	SCAN-TRON CORP	9- 16	16	+1/4	+1.
5					
N	SCIENTIFIC ATLANTA	10- 15	11 5/8	-1/8	-1.0
O	SEAGATE TECHNOLOGY	5- 9	8 1/4	+5/8	+8 1
N	STORAGE TECHNOLOGY	1- 4	2 7/8	-3/8	-11 5
O	SYKES DATATRONICS	0- 2	1/8	0	0.0
A	T 8AR INC	5- 9	6	+1/4	+4 3
A	TA8 PROOUCTS CO	14- 21	17 1/8	-3/4	-4 1
O	TANDON CORP	3- 9	4 3/8	-1/4	-5.4
A	TEC INC	7- 13	6 5/8	-3/8	-5.3
N	TEKTRONIX INC	47- 68	57	+5/8	+1 1
N	TELEX	34- 61	60 1/2	+1	+1.6
O	TESOATA SYSTEMS CP	0- 3	1 1/4	0	0.0
N	TIMEPLEX INC	15- 23	16 1/2	5 1/2	-25.0
N	TITAN CORP	4- 10	10	+1/4	+2 5
O	VISUAL TECHNOLOGY	1- 3	5/8	0	0.0

SUPPLIES & ACCESSORIES

EXCH		52-WEEK RANGE (1)	CLOSE JAN 15 1986	WEEK NET CHNGE	WEEK PCT CHNGE
N	AMERICAN 8US PROOS	21- 35	30 1/8	-4 3/8	-12.6
N	8ARRY WRIGHT	17- 29	19 1/8	-1/4	-1 2
A	OUPLEX PROOUCTS INC	13- 22	19 3/4	-5/8	-3.0
N	ENNIS 8US. FORMS	14- 24	22 1/2	1/2	-2 1
N	3M COMPANY	74- 92	89 1/4	+3/4	+0.8
N	MOORE CORP LTO	15- 22	19 1/2	-1/4	-1 2
O	STANDARO REGISTER	22- 39	36	1/4	-0.6
N	WALLACE COMP SERVICE	30- 41	39 3/4	-3/4	1.8

Source: Trade Quotes, Inc.

COMPUTER INDUSTRY

INSIDE

Kaspar V. Cassani, chairman of IBM Europe, discusses Big Blue's European strategies in computers and telecommunications/**113**

A U.S. House Republican task force has placed high-tech industry issues on the congressional legislative agenda for 1986/**118**

INSTANT ANALYSIS

"The semiconductor firms likely to enjoy the greatest growth and market share increases in the next upturn will be those with the most outstanding new products and the ability to manage their growth."
— Edward White Jr., E. F. Hutton & Co.

Strong final quarter unable to give IBM a winning year

By Clinton Wilder

An industry awaiting optimistic news from its market share leader failed to receive it last week as IBM reported that its 1985 earnings dropped slightly on a modest 9% gain in revenue.

A strong fourth quarter of approximately 20% profit and revenue growth was not enough to reverse three earlier quarters of year-to-year declines, putting IBM far short of its stated goal of 15% annual earnings growth. Despite continued signs of recovery from the fourth-quarter results of other leading vendors such as Digital Equipment Corp. and Apple Computer, Inc., IBM President and Chief Executive Officer John F. Akers sounded a gloomy note for the year ahead.

"There is an absence of continuing evidence the North American economy is showing sustained improvement, and we are approaching 1986 with caution," Akers said. "We are managing our costs, expenses and other resources carefully. We remain optimistic about the future of IBM and the overall computer industry."

Akers attributed IBM's first decline in year-to-year profits since 1979 to "an uncertain North American economy, currency fluctuations, sluggish capital spending by our customers and an early 1985 pause in high-end processor installations." Akers said "substantially all of the growth" of 1985 shipments came from IBM's overseas operations. But even a stable dollar throughout the year would have resulted in an earnings gain of just 0.2%, the company estimated.

For the year, IBM earned $6.55 billion, or $10.67 per share, compared with $6.58 billion, or $10.77 per share, in 1984. Sales reached the $50.05 billion mark, up from $45.94 billion in 1984.

Fourth-quarter earnings rose 23.4% from $2.17 billion, or $3.55 per share, in

See **IBM** page 144

High cost of marketing Ability

Canadian software start-up incurs $5.6 million debt

By Douglas Barney

TORONTO — Robert Hryniak was no ordinary software executive. The president and founder of Xanaro Technologies, Inc. was a man with a mission. "I don't want to become history," Hryniak said last year. "I want to make history."

Hryniak of Xanaro Technologies.

Less than a year later, however, Hryniak's company is in receivership, the Canadian equivalent of bankruptcy. Slow sales and expensive promotions of the company's highly-touted integrated software program, Ability, have caused Xanaro's debts to reach $5.6 million.

Xanaro's failure was in trying to buy its way into the market with money it did not have. It is the saga of a good product that never fulfilled company ambitions to see it competitive with products from Ashton-Tate and Lotus Development Corp. It has left a trail of dashed hopes and angry creditors, and it provides both a capsule history and a lesson on recent trends in the micro software industry.

Although both Lotus and Ashton-Tate met with disappointment in the market for five-function integrated micro software, Hryniak believed an innovative and easy-to-use product would be successful. He financed the marketing and development expenses with his own money, along with

See **CANADIAN** page 122

INDUSTRY INSIGHT
Maura McEnaney
West Coast Correspondent

SIA predictions lack credibility

As several of the major chip firms last week announced dismal fourth-quarter earnings, the industry's trade association is coping with some problems of its own.

Recently, the Semiconductor Industry Association (SIA) named Andy Procassini to succeed eight-year veteran Thomas Hinkelman as president. Hinkelman will retire in February. Procassini joined the SIA from South Korean chip manufacturer Hyundai, which has all but closed its U.S.-based operations. He has also worked at Westinghouse Electric Corp., Motorola, Inc. and Fairchild Camera & Instrument Corp.

Over the years, the SIA's annual industry forecasts have been something of a laughing matter within industry circles. Compiled by a group of SIA members called the World Semiconductor Trade Statistics (WSTS) group, the forecasts are consistently optimistic, to the point of being downright exaggerated.

The SIA predicted a 22% increase in business for 1985, a year that later became known as perhaps the worst the industry has ever seen. For 1986, the SIA expects a "dramatic turnaround" in the chip business and has predicted an 18% growth rate.

Because the SIA numbers turn out to be consistently high, they are given little credibility by high-tech observers.

However, Procassini does not believe the SIA is suffering from an image problem. "I have no criticism of the past," Procassini told *Computerworld*. "I believe the SIA is very highly regarded."

Nevertheless, this year the WSTS will become an organization "indepen-

See **SIA** page 113

Greene ruling tightens control over regional holding firms

By Bryan Wilkins

WASHINGTON, D.C. — U.S. District Judge Harold Greene, expressing sharp displeasure at the efforts of the AT&T regional holding companies to loosen the restrictions of the AT&T divestiture terms and conditions, said last week that the regionals' efforts to offer shared tenant services and services outside their franchise areas were not permitted.

The tone of Greene's ruling indicated his intention to keep intact the central provision of the divestiture decree — the prohibition on the seven regional holding companies from providing long-distance and information services. The ruling's effect will be to force a strategic rethinking by the seven regional holding companies, which have been mounting a campaign to change the barriers against entry into information services.

"That prohibition has far from outlived its usefulness. Indeed, it could, with some justification, be argued that the regional holding companies, though obviously smaller than the former Bell system, present dangers to competition that are in some respects even greater," Greene said in his court order.

At the same time, the Federal Communications Commission last week, ruling separately on a motion by IBM, declined to knock down state regula-

See **CONTROLLING** page 118

Comdisco-IRS tax battle may spell trouble for computer lease industry

By Clinton Wilder

ROSEMONT, Ill. — In a move with potentially serious implications for the computer leasing industry, the Internal Revenue Service has proposed levying a $200 million tax assessment against independent leasing industry leader Comdisco, Inc.

The IRS contends that Comdisco should have reported as income the full amounts of leases it wrote between 1980 and 1982 rather than spreading the amount over the term of the lease. Both Comdisco and the Computer Dealers and Lessors Association (CDLA) have strongly argued the point, saying the accounting practice is common in leasing activity in all industries.

"We do not feel the IRS case has much chance of success," said CDLA Executive Director James Benton, who is scheduled to meet with IRS representatives on the issue tomorrow. "Our members are absolutely baffled by this. If the IRS prevails, there is hardly a company in the U.S. in all industries that won't be affected by it."

The proposed assessment stems from IRS audits of Comdisco's books in 1980, 1981 and 1982. The IRS is also auditing the company's tax filings in 1983 and 1984. The current issue is unrelated to the controversy over Comdisco's accounting practices more than two years ago, when a published report criticized the firm for reporting the anticipated residual

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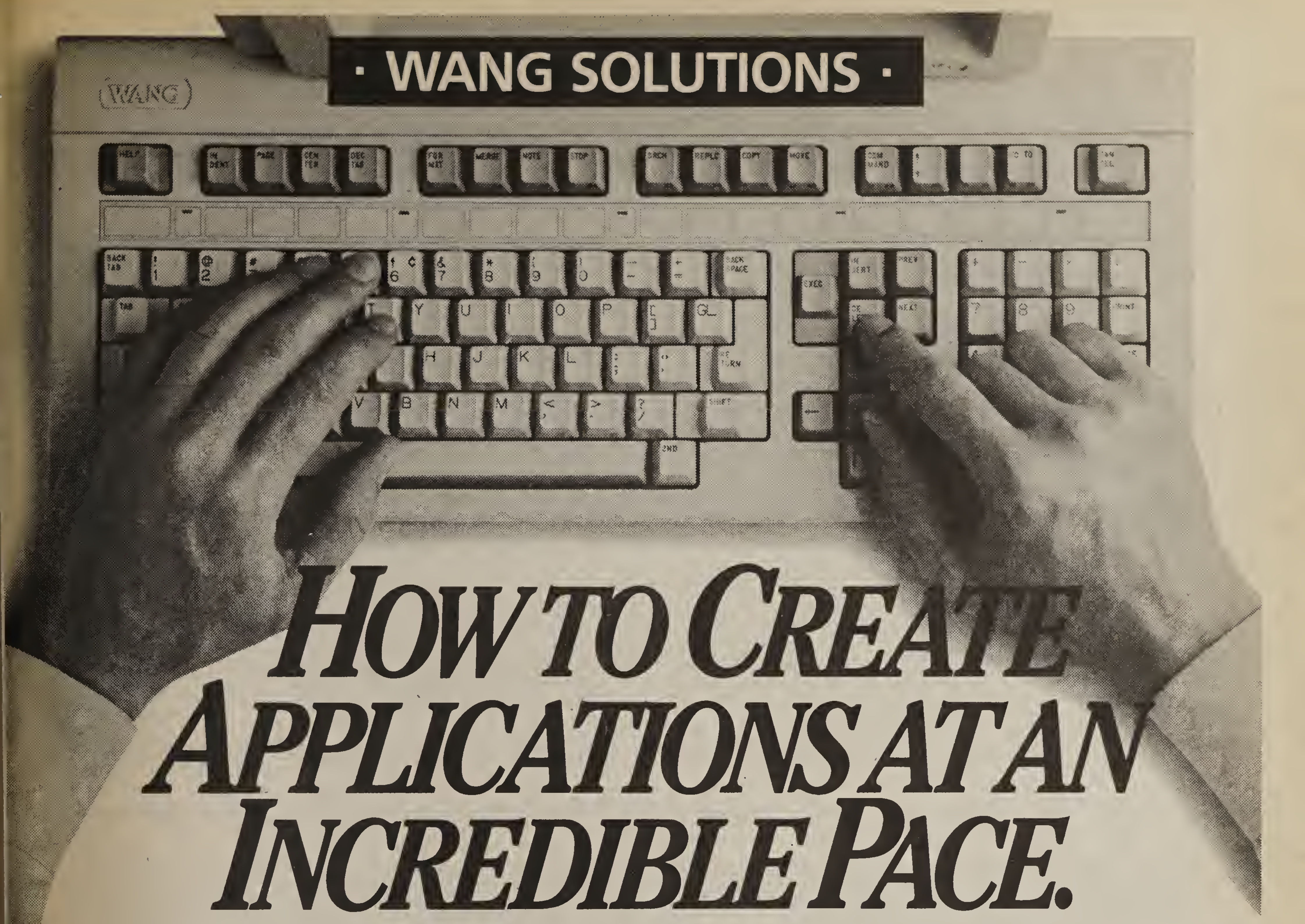

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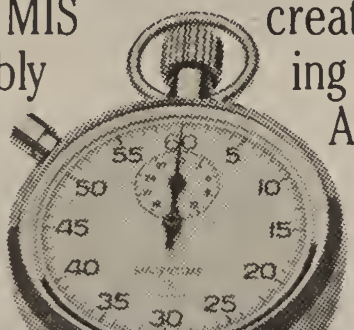

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